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ORIGINAL ARTICLES

PRESIDENT'S ADDRESS*

BY ERNEST N. BACH, A.B., D.D.S., TOLEDO, OHIO

THIS day it becomes my honor and privilege to address you, as President of the Great Lakes Association of Orthodontists, at this the fifth annual meeting.

I keenly sense your vote of confidence in electing me to the highest office in our organization, and am fully aware of the duties which accompany such an honor. In arranging this meeting we have been confronted with many problems and responsibilities. Whatever these have been, it has given me a great deal of pleasure and satisfaction to carry them out in my humble way, knowing full well that the efforts expended would be appreciated by our members.

I am extremely happy to welcome our guests and friends here to share this program with us.

I feel certain the program and clinics which have been arranged for this meeting will prove of real interest and value, and will afford you material of practical worth for many weeks to come.

I hope your visit will be a most enjoyable and profitable one.

Owing to expense involved and various other reasons, we have confined our program in the past to an afternoon and evening session, with one and not more than two essayists appearing before us.

We know that some of the meetings of the American Society of Orthodontists are quite remote from our section, resulting in a number of our members and other practitioners in this area not being able to attend these meetings. With this and other things in mind, a meeting of the officers and Board of Censors was called last June to discuss the advisability of preparing a two-

*Read at the Fifth Annual Meeting of the Great Lakes Association of Orthodontists, Toledo, Ohio, February 16, 1931.

day session for this meeting, which was decided in the affirmative with the present program as the result.

I sincerely wish to thank Dr. George Moore, who is mainly responsible for our scientific program, and Dr. Walter Sargeant for securing so many and varied clinics, and am very grateful to the other officers and members, who have put their shoulders to the wheel and worked faithfully and willingly.

When this program was being arranged I could not help but feel that Dr. Moore was afraid he would run short of material, and that is the only reason that I can offer for the president's address being allotted time on the program. I know that our time is well taken up with the program as outlined; therefore, I wish to confine my talk to only a few brief remarks.

One cannot be in practice for ten, eight or even five years, without having a few outstanding things forcibly brought to one's attention. This has held true in my case. During my short career in orthodontia some of these incidents or facts have been directed to my attention so often that I am going to mention a few of them here for your consideration. These remarks I feel will be of more interest to the newer men in orthodontia than to the older practitioners.

Knowing how to care for or treat an orthodontia case is probably the most important factor to us.

One of the first thoughts which comes to my mind is our relation to our patients. We have been taught this in our schools, it has been told to us by our seniors, but there is always the personal equation which enters in and which must be dealt with by oneself. It must be worked out by the individual.

The patient should be made acquainted with our limitations in work on his particular case. The impossible and doubtful prognosis, as well as the possible and encouraging termination of the case may well be explained. A definite understanding should be had as to the estimated time required for treatment, together with the fee and arrangements for taking care of this obligation. A patient whose payments are kept to date invariably is agreeable and pleased, while the reverse very often is true of the delinquent type. Our professional standards recognize service first, but before we proceed with a case we should arrive at an understanding with our patients as to their obligations to us, as many misunderstandings and unpleasant situations may thus be avoided.

My experiences with children in our office have been most gratifying. I cannot conceive of anyone practicing orthodontia who does not have the highest regard for and interest in his young patients.

Unconsciously we gain much by their presence, and likewise I feel our personality, actions and conduct are indirectly registered in their minds.

Another thought which suggests itself is that pertaining to records. It is true that records carried to the nth degree become burdensome, and are often neglected and finally disregarded. Each of us knows what we are most interested in, what we should like to check on or follow up, or what data we should like to collect over a period of years, our agreements or conversa-

tion with patients, etc. But trying to outline any procedure in this direction would require considerable time.

The matter of recording nutrition and oral pathology has been an interesting one to me. Two things which prompted me to record data of this nature were: first, to correlate the subject of nutrition with that of tooth pathology; and second, to have a definite record of the teeth and general oral pathology for diagnosis and future reference. A detail record of nutrition, etc., is kept of each mother during pregnancy and of the patient at the present time. All of these records if correlated would provide an interesting discussion, and since time will not permit, allow me to say of the permanent molar teeth examined in the past six years, before any appliances were placed on them, only on one of these teeth did we fail to disclose at least a faint white line at the gingiva on the buccal surface. Invariably a decided disintegration of the enamel was found on the buccal, lingual, mesial and distal surfaces, and more pronounced after being thoroughly dried by air.

A complete dental x-ray examination of both arches is indispensable, and most certainly advisable before even attempting the diagnosis of any case. To be sure, objections are often voiced by the parent, which objections are much more desirable before than after work has been under way. Shortened roots, missing teeth, supernumerary teeth, impactions, peridental conditions, caries, etc., are among the important things revealed in x-ray films.

To me one of the most interesting phases of orthodontia is that one dealing with appliances. Without appliances orthodontics would not have progressed very rapidly. While on the other hand, I believe the greater fields of research lie in the future and along other avenues of study. Do not misunderstand me, for I believe appliances will always have their place in the treatment of malocclusion.

When I speak of appliances I do not refer to any particular type, neither do I have any special one in mind, but rather am speaking in generalities. Very often we see a clinic or hear a paper on this subject, over which we may become enthusiastic from the very beginning, only to find its application limited or not satisfactory in our hands. Another type of appliance may not appeal so strongly to us at first, but by use may prove very efficient. My feeling is that one should not be too confident in the use of one appliance over another. Be open-minded and conservative. Use that appliance which seems best to fit the case, as it may be of advantage to use a number of combinations of appliances to produce the desired results. I feel there is as great an opportunity for individuality in constructing appliances as there is in any department of dentistry. We are called upon in so many ways to make a decision as to the procedure or change in construction of an appliance which could not be left to a laboratory technician.

At the beginning I spoke of our relation to our patients. Let us turn to another consideration, that of our relation to our colleagues in general practice. It is to them that we and our patients owe a great debt of gratitude. They usually are the first to observe cases of malocclusion, in turn referring the patient to us for treatment. We all have been asked by them

what we would advise in a case of this or that type of malocclusion, or at what age orthodontic treatment should be started. These are questions not answered in journals or dental colleges, and I feel it is our duty to pass on the information and present-day knowledge we possess to our fellow dentists in general practice. They are entitled to this information and we should be equipped and ready to serve in this capacity.

It is unfortunate in our practice that patients who are referred by their dentist to us for treatment do not always return to him for his services. In other words, it is very embarrassing for us to have a patient decide to change dentists while in our care. This occasionally happens in spite of our efforts to have them continue with their former dentist. When this situation arises, aside from being a courteous consideration, I believe it is our duty to inform the first or referring dentist of the patient's intentions, explaining to him our intercession in his behalf, likewise, we should inform the new dentist of the situation.

We should, or at least I believe we should, at each visit of the patient clean the teeth where it has been difficult for the patient to do so because of various appliances. The patient should be informed that this is not a thorough prophylaxis and that he must return for this service to his dentist at regular intervals designated by him or us. This should avoid the controversy as to who is taking care of the general prophylaxis.

RECOMMENDATIONS

When our Association was organized, I believe it was the intention of the men present to organize in order to form more or less a study group, with meetings as often as would be advisable. Owing to the great number of dental and other meetings it was decided to hold two meetings a year. Inasmuch as one of these meetings has turned out to be practically a business meeting, I would recommend that our constitution and by-laws relating to meetings be changed to provide for only one meeting each year instead of two.

I have a feeling that the various sectional orthodontic societies may in time be linked with the American Society of Orthodontists in a similar relation as the state societies are to the American Dental Association. This may be far in the future, or may never occur, but the thought has been in my mind that we make the necessary changes in our constitution to conform with that of the American Society of Orthodontists.

The journals in which the papers read before this Society shall be published are left in the hands of the Board of Censors. I wish to recommend another change in the constitution to the effect that THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY be designated as our official publication.

These thoughts, remarks and recommendations are offered to you for your consideration, and your courteous attention has been much appreciated.

THE PROBLEM OF OCCLUSIONS WITH MISSING TEETH*

By Fred R. Blumenthal, D.M.D., Boston, Mass.

THERE are many and varied opinions about the treatment of occlusions with missing teeth. I shall not attempt to solve this problem now, but I shall present to you my results of years of experience, showing what I personally have considered my successes and failures and from which you may draw your own conclusions. The subject has a very broad scope. I shall confine my paper to the more common types and from practical cases treated to the best of my judgment at the time.

First there are those cases with the congenital absence of the permanent teeth. Why these tooth buds are missing has not as yet been satisfactorily explained, and no individual tooth in the dental formula is immune from being absent.

These cases with congenital missing permanent teeth may be subdivided into:

(a) Those that have the corresponding deciduous tooth still in place;

(b) Those in which the deciduous tooth has been lost and we find the full space present, partially present, or closed. The amount of space present is a very important factor in considering the plan of treatment.

If the deciduous tooth is in position, the radiograph is quite accurate in revealing the presence or the absence of the unerupted permanent tooth; however, one must remember that the calcification period of the permanent tooth is extremely wide so that one should not be too positive or too hasty in diagnosing by radiographs the absence of tooth buds too early in the child's life. I have seen many cases of very tardy calcification and have seen permanent teeth calcify much later in life than at the age which is usually considered within the range of normalcy. If you are satisfied that the deciduous tooth will have no permanent successor, you must decide as to whether you should retain it or extract it; for this, too, is an important factor in considering your plan of treatment. If on the other hand, the patient presents himself with a missing permanent tooth and the corresponding deciduous tooth has already been lost, you should be very careful before making a positive diagnosis of congenital absence of a permanent tooth, for you must be quite certain of your history, even though the patient or the parent of the patient asserts definitely that a permanent tooth has not been extracted. It is not uncommon for the dentist to destroy or remove the permanent tooth bud, perhaps unknowingly, upon the extraction of the deciduous tooth or roots.

The second group of cases which presents itself to the orthodontist is that in which the permanent tooth must be removed or has already been removed for whatever cause.

*Presented before the New York Society of Orthodontists, March 11, 1931.

In the consideration of the treatment of patients presenting themselves with missing teeth, I do not judge the successes or failures of my cases only from the standpoint that in normal occlusion the anterior buccal cusp of the maxillary first permanent molar is supposed to rest in the median groove of the mandibular first permanent molar, for I believe there are many other factors which must be considered. Although I have the highest esteem for the wonderful contribution that Dr. Edward H. Angle has given to orthodontia, and although I still have as my theoretical basis to work to—Angle's key to occlusion—I am convinced that these landmarks have an extremely wide variation and cannot always be obtained and should not always be sought.

In considering these cases with missing permanent teeth, we must realize that we are dealing with abnormal conditions which may be an integral part of constitutional deficiencies or deformities. In view of this we must not lose sight of our human limitations as orthodontists. We must also realize that there is no absolute fixed rule that can be pursued in treating these cases. Each case is individual and is a law unto itself. An ideal occlusion in these cases is quite impossible, and the result at best is but a compensatory one. There is one main issue, which is "Shall we open or allow the space, if present, to remain open and insert an artificial restoration?" or "Shall we close or allow the space to close itself and accept the occlusion as such?" Some men advocate the maintaining or opening of all spaces in order that the full complement of teeth may be restored. They believe that unless this is done the facial harmony is affected. Others believe that the spaces should always be closed and thus avoid artificial restorations. There are still others, with whom I class myself, who use both methods, determining each instance by the many factors which should always be considered. Some of the factors to be considered in determining which procedure to carry out in our treatment of these cases are:

1. The age of the patient,
2. The general health of the patient,
3. The texture of the teeth and their general condition,
4. The number of teeth missing,
5. The teeth which are missing,
6. The relations the arches bear to each other,
7. The facial contour of the patient,
8. The occlusion of the teeth before treatment,
9. The probable occlusion of the teeth after treatment,
10. The availability of an orthodontist, and
11. The economic situation which must by necessity receive due consideration.

When we consider all these various factors it becomes evident that there is no individual method adaptable for all cases—there is no general rule—each case presents a problem of its own and must be treated as such. I have many times inserted artificial restorations; I have extracted teeth as a compensatory measure for the already missing teeth, and I have many times closed the spaces.

Although I have the highest respect for the beautiful restorative methods now employed by the skilled prosthodontist, I do not believe that these restorations can be regarded as true substitutes for natural teeth or that they can replace the ideal or normal occlusion. Therefore, if that is true, the prosthetic restoration is merely a relatively compensatory measure.

In my opinion, bridgework in its most perfect form should be used only when absolutely necessary, but by no means should it be sought after or planned for, especially in the mouths of young children. Whenever it is possible for me to establish an occlusion by closing the spaces occasioned by absence of tooth substance, if it reasonably fulfills the requirements of function without unduly sacrificing esthetic considerations, I do so.

Practical experience with a large number of cases has conclusively proved to me that the adult who has had the spaces closed, where the number of missing teeth is not too great, by skillful orthodontia early in life, has as a rule a much better occlusion and a much healthier gum condition than the adult who has had orthodontic treatment, plus artificial restoration. He usually has just as good a facial contour. We must not lose sight of the fact that our normal varies with our known accumulated knowledge and is ever changing. What is normal today may not be normal tomorrow. We are here to assist Nature. If we give Nature a chance, aid her by skillful orthodontia, within reason, where she has gone astray, she will certainly do her part and adjust her dental digits into a more efficient, a more practical and a more permanent occlusion than if we encumber her efforts by cumbersome mechanical appliances and with artificial restorations. Now in making this statement, I do not wish you to infer that artificial restorations can always be avoided and that I do not ever advise or use them. They most certainly have their place and in some cases must be absolutely resorted to. The disadvantages of bridgework, however, need hardly be discussed with this audience.

Let us be honest and practical with our patients; let us not attempt to build their occlusions as they build inert structures; let us realize the limitations of our skill and benefit our patients accordingly: let us not overlook the fact that orthodontia should not be considered only from the standpoint of what it will do for the patient during the period between the ages of four and fifteen, but that it should be considered from the standpoint of what it will do for the patient from the age of sixteen throughout adult life. This can well be considered from the negative as well as from the positive aspect.

Figs. 1 through 9 are radiographs of patients with the congenital absence of teeth, and I would ask that you visualize them from the viewpoint of orthodontic problems, for the next group of illustrations shows the results which I have obtained in cases with similar conditions.

Fig. 1 shows the congenital absence of the maxillary permanent central incisors, a condition which I have found quite rare.

Fig. 2 shows the congenital absence of the maxillary lateral incisors. These teeth are perhaps the most frequently missing in the dental formula.

Fig. 3 shows the congenital absence of the mandibular incisors, not at all uncommon.

The films in Fig. 4 are all of the same patient and show the congenital absence of the right maxillary lateral incisor, the left mandibular canine —not unusual, but not common—the mandibular central incisors, and the

Fig. 1.

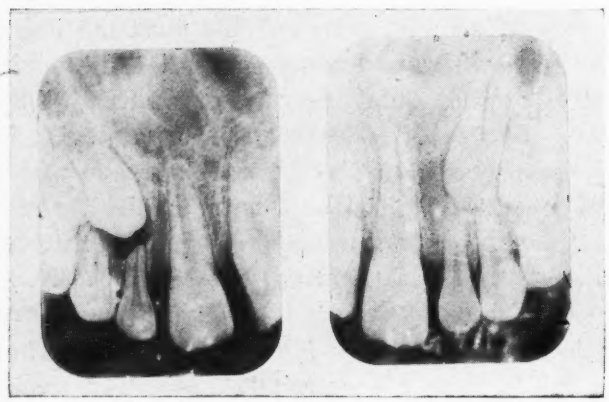

Fig. 2.

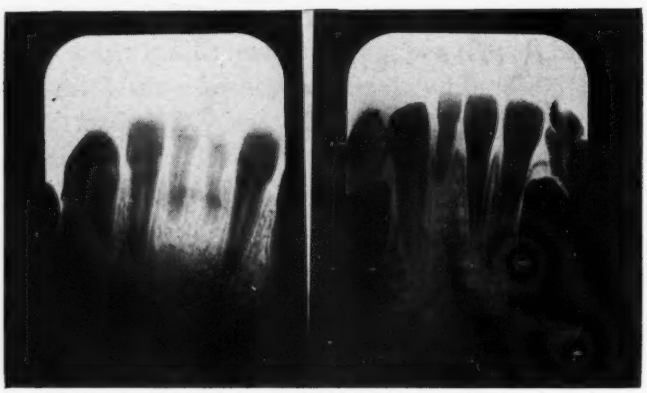

Fig. 3.

right mandibular second premolar (also what I believe to be the absence of the right mandibular second molar).

Fig. 5 shows the congenital absence of the second premolars; very often missing, especially the mandibulars.

Fig. 6 shows the congenital absence of the mandibular second molars, not at all unusual.

The patient shown in Figs. 7 and 8 is ten years of age. The radiographs show the complete absence of all permanent teeth with the exception of the maxillary central incisors and the four first permanent molars. Exactly similar conditions have been reported before.

Fig. 9 is that of a child approximately three years of age in which we find, clinically, only two peg-shaped maxillary anterior teeth, and the radiographs show the complete absence of all the deciduous and permanent buds, both in the maxilla and in the mandible, with the exception of what seem to appear as two irregularly formed buds in the maxilla.

Now as to the treatment of these patients presenting themselves with missing teeth. In my introduction, I stated that these cases should be divided into those in which we have the deciduous tooth still in position, and those

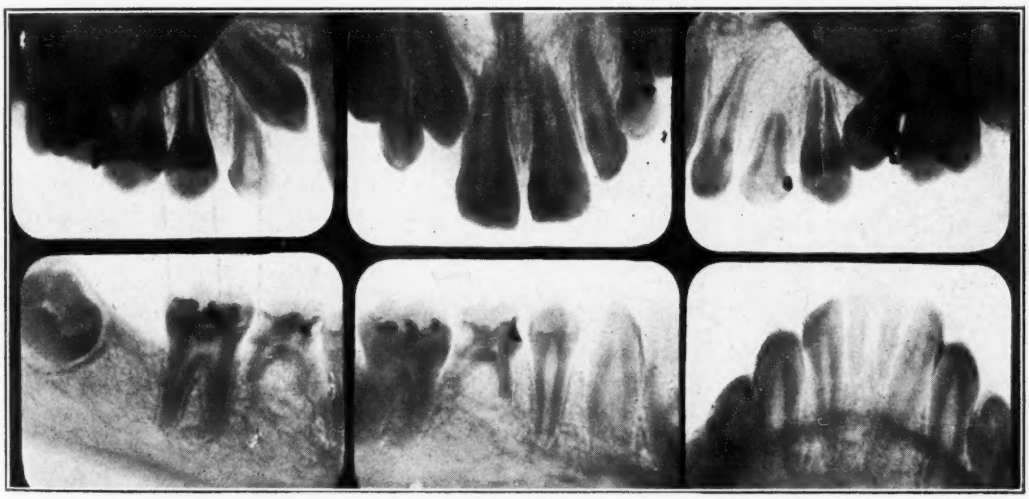

Fig. 4.

in which the deciduous tooth has been lost. We shall now consider those cases where the deciduous tooth is still in position and its permanent successor is congenitally absent. We must first decide as to whether we desire to retain this deciduous tooth or whether we desire to extract it. The location of the particular tooth in question, the condition of the tooth, the occlusion, and the family history are important factors in determining our procedure. If it is a lateral incisor or a canine in good position, good solid enamel formation, and with no root resorption at the age of nine, ten, or eleven years, I believe I should favor the retention of the tooth, although, of course, other factors present might reverse my decision.

In the case shown in Fig. 10 the maxillary permanent canines were congenitally missing. The deciduous canines were firm, no root resorption, good appearing, and of fairly strong texture. I decided to allow these teeth to remain, and at twenty-one years of age, when this radiograph was taken, the deciduous teeth are as firm as when I saw the patient many years ago. One tooth, however, had a palatal filling. The occlusion is very satisfactory.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

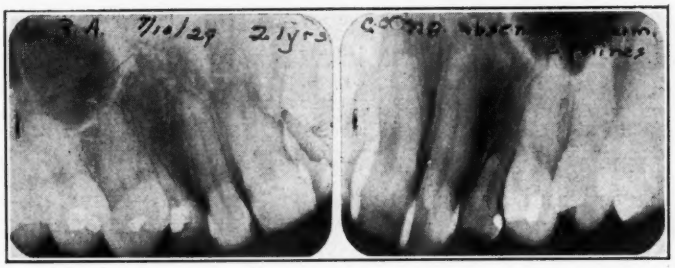

Fig. 10.

Now, if the tooth in question is a deciduous molar, and I saw the patient early in life, and the conditions present would permit the obtaining of an efficient occlusion by the extraction of the tooth, and closing the space, I believe that as a general rule I should favor the extraction. Here, again, other factors present might reverse my decision. For instance, I have found that in some families, the mandibular second premolar is congenitally absent in the mother and in every child, and that the second deciduous molar is a strong, well-formed tooth and has been retained well into adult life by the parent. In these cases I have allowed the deciduous tooth to remain in position with satisfactory results. The basis for my usual extraction of the deciduous molar, however, is borne out by Fig. 11. Here you see three typical examples in three different children, with retained deciduous molars which have no permanent successors. It is not uncommon at all

Fig. 11.

to have these teeth wedged between the adjoining teeth, and I have seen them wedged so far down that the gum tissue practically closes over them. This is illustrated in the lower left radiogram. In the lower right radiogram you will notice the wedging of a mandibular second deciduous molar between the two adjoining teeth; note the resorbed roots and the bone absorption allowing a definite pocket, a condition which is unhealthy at best. The tooth performs no function and the patient would be better off if the tooth were extracted and an artificial substitute were inserted, or the space closed, allowing a functional occlusion. The upper radiogram shows a maxillary second deciduous molar without any permanent successor. I have found that in the majority of these cases, these teeth have a tendency to break down early in adult life and require extensive fillings or removal. Therefore in these cases where in my opinion the deciduous molars are of such a texture that they are liable to break down in adult life, I favor their early removal

and treatment accordingly. Under no condition do I favor the retention of a devitalized deciduous molar.

Fig. 12 shows the congenital absence of both the maxillary permanent lateral incisors. The patient is twelve years of age. This case is being cared for entirely by Nature, unaided by orthodontic skill. I believe that with the

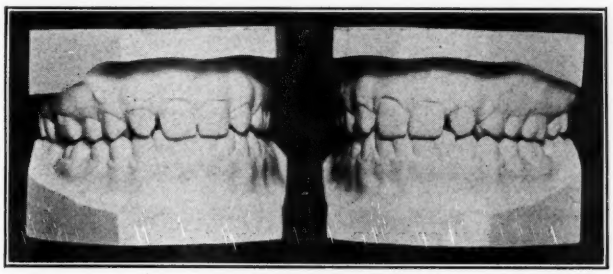

Fig. 12.

Fig. 13.

development of the third molars and the natural tendency toward mesial migration, the spaces will eventually be closed, and the rearrangement of the teeth will give the child an efficient and satisfactory occlusion.

Fig. 13 shows the photographs of this case. In my opinion the harmony of this face has not been seriously affected by the absence of these two teeth. I should consider this child as having an efficient compensatory occlusion

with a satisfactory esthetic appearance. I have found that in some of these cases a slight rotation of the canines with a gradual grinding of the cusps does aid the appearance somewhat.

Fig. 14 is of a case treated by Dr. Cleophas Bonin, who very kindly loaned me the slides. The patient was twenty-eight years old and was congenitally missing both of her maxillary lateral incisors. Her appearance was

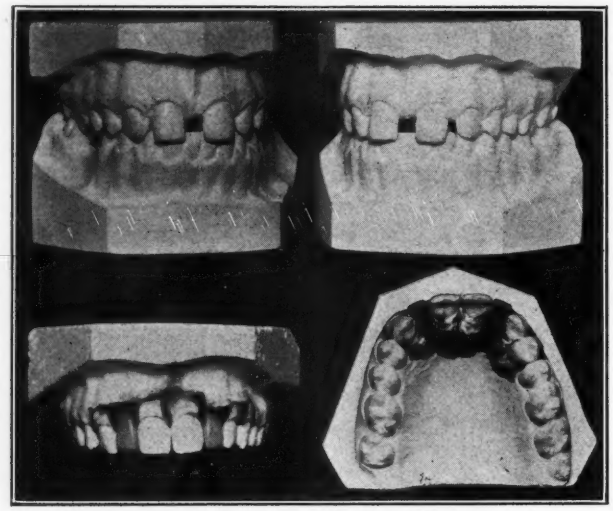

Fig. 14.

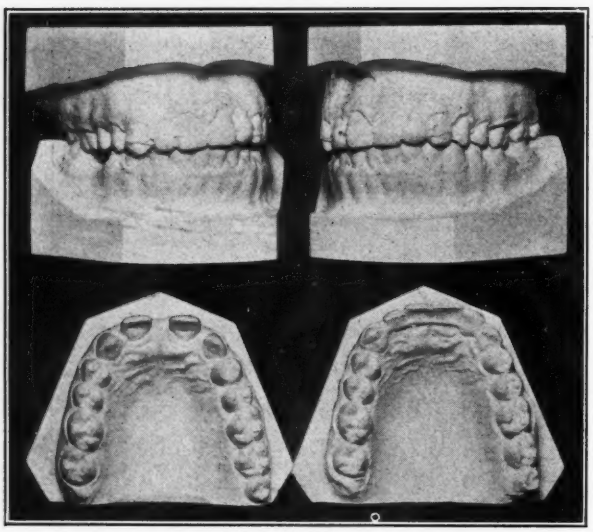

Fig. 15.

greatly marred by the large space between the central incisors. Dr. Bonin studied the case and satisfied himself that the closing of the space and the insertion of artificial lateral incisors was advisable. The lower models show how he studied and planned his treatment. He took his plaster study model and carefully cut out the central incisors and canines. He rearranged them in wax and inserted artificial lateral incisors as shown. Now, satisfied with his decided procedure, he treated the case with the splendid result shown in

Fig. 15. This case has just been completed within the last year, and so he still has a retainer in position. The lower models show the occlusal views before and after treatment. I believe that Dr. Bonin's judgment was excellent, that the case necessitated the insertion of artificial substitutes and that the result was most successful.

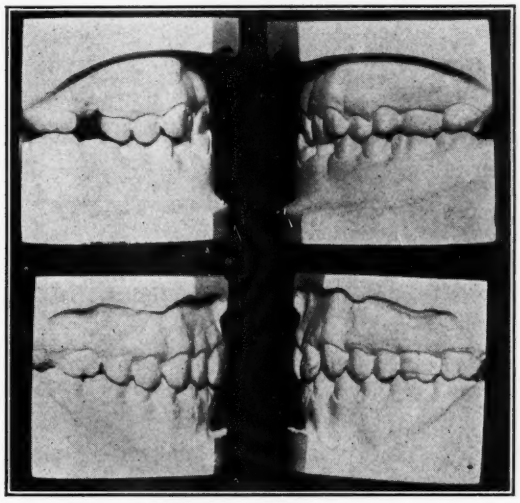

Fig.16.

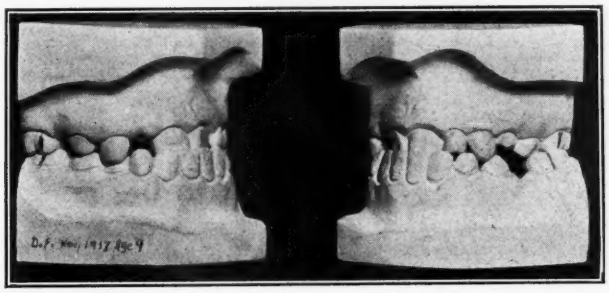

Fig. 17.

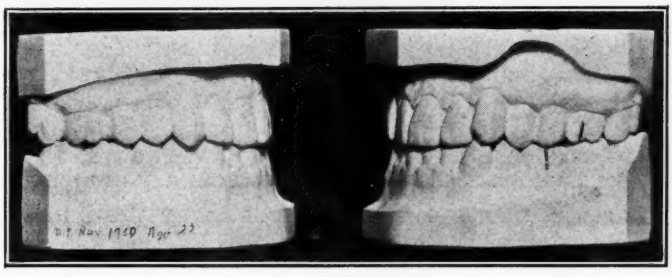

Fig. 18.

Fig. 16 is that of a patient fourteen years of age who had just lost the right maxillary first permanent molar because of caries. Note the space present and also the anterior deformity. The lower models show the result after treatment; the anterior deformity was corrected and the space closed by moving the second permanent molar mesially. I believe the occlusion is now better and more practical than if an artificial restoration had been inserted.

The patient in Fig. 17 was the oldest of a family of three children, all of whom had a mesial occlusion in various degrees with prominent chins and with definite tendencies toward prognathism. As the models show, November, 1917, age nine, this boy did not have a marked mesial occlusion in the molar region, yet the entire dental aspect had a prognathic appearance which to the experienced orthodontist presents a typical picture of a certain type of prognathism which is oftentimes difficult to retain after orthodontic correction. By developing the maxillary arch and correcting the relationships of the arches, a quite satisfactory appearing result was obtained for the time, but the case had a definite tendency to become prognathous and I was obliged to re-treat the case a second time, and again there was a tendency toward prognathism and the result was not at all satisfactory. The left mandibular second premolar was a poorly developed tooth, the enamel was mottled and

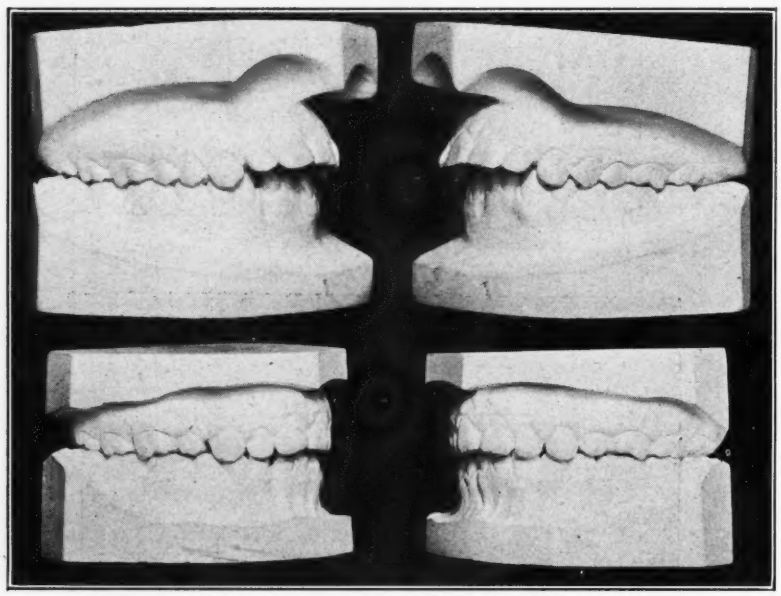

Fig. 19.

soon broke down and caries necessitated its removal. I was again consulted and I decided to insert an orthodontic appliance, attempting to take advantage of the space caused by the removal of the second premolar. There was some mesial movement of the left inferior first permanent molar, although, of course, that was not desired. The boy is now a young man, aged twenty-two years. The result now shown, Fig. 18, is many years after all appliances were removed. The result obtained is far from perfect or a normal occlusion, yet taking into consideration the difficulties encountered by two previous unsuccessful attempts by orthodox orthodontic treatment, I feel that the patient now has a fair, a practical and efficient occlusion, one that will remain as such, and which was accomplished by closing the space occasioned by the loss of the second premolar. His facial appearance is quite satisfactory and certainly has not been disfigured by this orthodontic procedure.

Fig. 19, in this case the patient was nineteen years of age. Through an accident a few years before, she fractured her mandible in the anterior re-

gion, and lost two teeth, the right mandibular canine and a mandibular incisor. The case had other complications at that time. The superior anterior protrusion was quite marked as shown by the models and photographs. From the history obtained, her age, and the general condition of her teeth, it

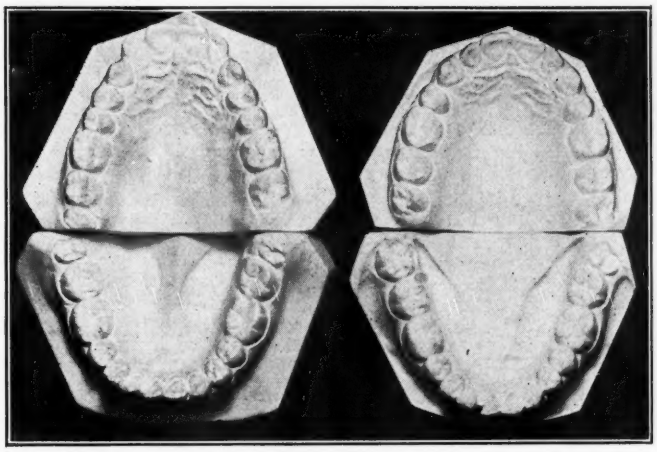

Fig. 20.

Fig. 21.

was not deemed advisable to interfere with the mandibular teeth or arch. I, therefore, extracted the left and right maxillary first premolars, compensating for lost tooth substance in the mandibular arch, and retracted the six maxillary anterior teeth, thus closing the spaces, and the result shown by the lower models, obtained by a compensatory extraction of teeth, is in my opinion a practical, efficient and permanent one. Fig. 20 shows the occlusal

views before and after treatment. There has been a decided improvement in facial harmony as shown in Fig. 21. Fig. 22 shows the condition many years after treatment. There has been no tendency for the condition to revert.

Fig. 23 shows a patient with a mesial occlusion, complicated by the congenital absence of both the maxillary permanent lateral incisors. In a mesial occlusion case where we have a well-developed mandible with the full complement of teeth, the absence of maxillary anterior tooth substance complicates matters considerably, especially for those men who prefer to close the spaces

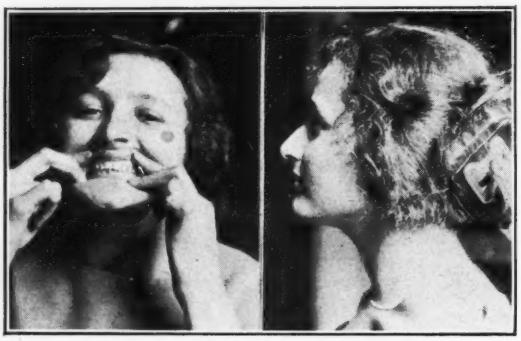

Fig. 22.

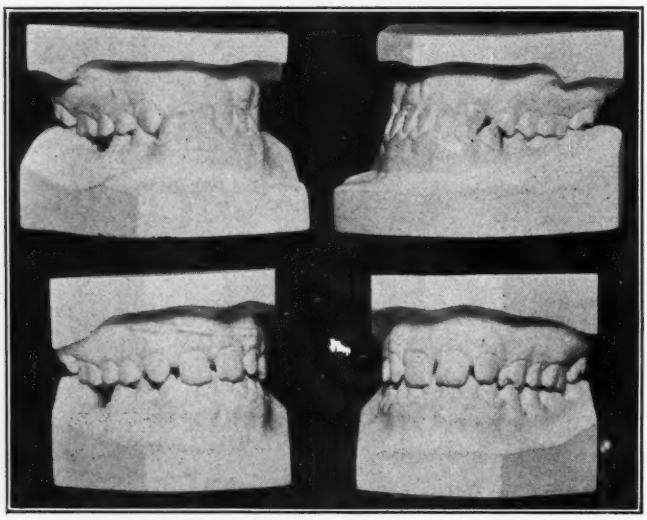

Fig. 23.

rather than to insert artificial restorations. In this case no bridgework was inserted and the lower models taken several years after treatment are for your consideration. Would you have inserted artificial restorations, and if so would the efficiency have been improved? Fig. 24 shows the photographs before and after treatment. Would the facial appearance have been improved if artificial bridgework had been inserted? If it is the consensus of your opinions that the result would have been better by the insertion of bridgework, I should appreciate your expression of opinion for I shall attempt to benefit the child of this patient by your advice, for I now have her under observation for a quite similar condition.

Fig. 24.

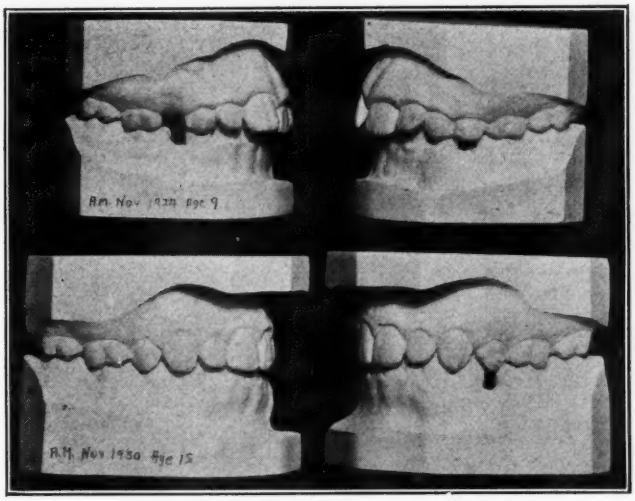

Fig. 25.

Fig. 25—this boy was congenitally missing three second premolars, namely, the right maxillary, the right mandibular, and the left maxillary; the left mandibular second premolar was present. All four second deciduous molars were in position. The patient also had a malocclusion of the anterior teeth as shown by the models. This case was treated in 1924. Patient was then nine years of age and in view of this and other findings, I advised the

Fig. 26.

extraction of the four second deciduous molars, the surgical removal of the left mandibular second premolar, the closing of the spaces and the correction of the anterior deformity by orthodontic appliances. The parents agreed to the extraction of the four deciduous molars which was done immediately, but would not consent to the removal of the *left mandibular second premolar,* desiring to await natural development. Kindly keep this factor in mind. The case was treated accordingly for a period of about twelve months when all appliances

were removed. He then went away to school and I did not see the patient again until the fall, November, 1930, five years later. The left mandibular second premolar had in the meantime erupted lingually, it was carious and was giving him trouble, and his dentist extracted it in October, 1930. I would now call your close attention to the results shown by the lower casts and then by the radiographs which will follow. I believe that the occlusion on the right side is excellent and that the occlusion on the left side would have been similar to the right side had the parents allowed me to remove the left mandibular second premolar in 1924. However, you now see that there is a space present, between the left mandibular first premolar and first permanent molar. It is not large enough for a good restoration, and unless orthodontic treatment is ren-

Fig. 27.

dered to close the space, the posterior teeth at his present age may tip forward, and will cause an unhealthy pocket with probable bone absorption. Now I would ask that you view the radiograph in Fig. 26, carefully. The upper radiographs show the condition before treatment and the absence of the three second premolar teeth. The lower radiographs show how beautifully the spaces in the right maxillary, right mandibular, and the left maxillary premolar regions have closed. Note the vertical position of the first permanent molars, their root positions, the healthy bone condition. Now note the left mandibular premolar—molar region, where the second premolar has recently been extracted, and you will clearly see the tendency of the first molar to tip mesially. I believe this case shows the advisability of judicial extraction of permanent teeth in these cases complicated by congenital deficiencies.

I believe that this boy has been benefited by the closing of the spaces occasioned by the congenital absence of his permanent teeth, that he has a good and functional occlusion and one that will remain as such throughout adult life. I, of course, regret the parents' refusal to allow me to remove the left mandibular second premolar when the case was first treated. Had this been done, I believe he would have had a most satisfactory occlusion, yet allowing for this he has in my opinion an occlusion that is much better than he would have had, if we replaced the second deciduous molars by artificial restorations. Fig. 27 shows photographs. His facial appearance has not been seriously affected by this supposedly radical procedure and he has a clean, healthy mouth.

Fig. 28 is a picture well worth reviewing and remembering: Old Glory, as it has been termed, in the museum of the Harvard Medical School, a most beautifully developed face and skull and a most beautiful occlusion, one that we all have as our goal and which we all strive to obtain, but can we, as ortho-

Fig. 28

dontists, expect to accomplish this result when Nature herself has failed and has also failed to give us the proper material with which to build it? I would state here that I am not in favor of continuous active orthodontic treatment over a period of many, many years; in fact indefinite years, in these cases where the results which we may hope to accomplish are only questionable. I am convinced that too many orthodontists do not take into careful consideration the general health of the patient, the wear and tear, so to speak, upon the patient, the tooth and bone material with which we have to work, the possible injury to the teeth themselves by the long use of some of the appliances which I have seen and that the final result obtained does not warrant the chances which have been taken in the attempt to obtain the perfect occlusion now before you on the screen.

In conclusion I would state that in considering the treatment of any case, I do so with the following thought in mind: "Will the result which I may be able to obtain for the patient be of sufficient benefit to compensate for that which I may cause him to undergo by orthodontic treatment?"

I judge my successes or failures in the treatment of cases with missing permanent teeth, whether they were treated by the insertion of artificial restorations or by the closing of the spaces, by the following results:

First, whether or not I have been able to obtain for the patient an efficient and functional occlusion and one which will remain as such throughout adult life;

Second, whether or not I have properly cared for the esthetic situation;

Third, whether or not I have preserved the teeth and their related structures in a healthy and hygienic condition.

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DISCUSSION

Dr. Ashley E. Howes.—When Dr. Blumenthal first sent his paper to me to read, in order to discuss it, he said, in effect: "Do not hesitate to criticize, as any personal benefit which I may derive from writing this paper will come from the criticism which it receives." I am sorry to disappoint Dr. Blumenthal, for if the treatments described in this paper warrant adverse criticism, it will have to come from the general discussion following, and not from mine.

I think that he has presented his subject in a logical manner and arrived at logical conclusions. The results, which he has shown here this morning, while not selected to prove any particular contention are convincing. He holds to the middle of the road, retaining deciduous teeth sometimes, sometimes extracting them, making compensatory extractions of permanent teeth, having artificial restorations made if absolutely necessary, but as a rule closing spaces. Although his paper is so clear and concise as to call for no general review from the discusser, I will quote one sentence from it which seems to sum up, in general, his convictions as to treatment of these cases. He said: "Whenever it is possible for me to establish an occlusion by closing the spaces occasioned by absence of tooth substances, if it reasonably fulfils the requirements of function without unduly sacrificing esthetic considerations, I do so." I share with Dr. Blumenthal the conviction that this is good orthodontia.

He showed in Fig. 28, and asked us to remember, a beautiful occlusion, a masterpiece of nature, and then voiced his regret that orthodontia could not obtain such results. Rarely can we obtain such results with a full complement of teeth, while of course with missing teeth, it is, naturally, impossible. If I had several missing teeth, I should rather have in my own mouth an efficient denture, of good appearance with spaces closed, than to have an occlusion like "Old Glory" itself, if part of that denture must consist of artificial restorations. We are trying to give the patient a lifelong, serviceable denture, not to obtain a beautiful result of great credit to orthodontia when the appliances are first removed, and the artificial restorations are inserted, but possibly of less and less credit as the patient grows older.

It has been claimed that when we close spaces and attempt to fit certain teeth with any but their normal antagonists, we are violating laws of nature, and materially lessening the length of time which these teeth will be of service. My opinion is that in closing spaces of missing teeth, if the case is favorable for such a procedure, we are not going against nature's plans to as great an extent as we would be if we open the spaces and strap the adjoining teeth with prosthetic appliances. In fact, the natural tendency almost always seems to be for the spaces to close.

We have all seen malocclusion caused by the premature loss of deciduous teeth and the consequent drifting of the first molars. In these cases, the premolar is still in position, and when the first molar drifts forward, the roots are held back by the unerupted premolar and

the crown tips forward over it. When a tooth is actually missing, especially a maxillary tooth, I think we often get a forward drift of the tooth distal to the space, with little tipping, at least not as much as there would be if the missing tooth were present, but still unerupted. In cases where the first permanent molars have been lost, the maxillary second molars seem to drift forward and close the spaces more rapidly and with less mesial tipping than do the mandibulars. I think there are several reasons for this. Due to the upward curve of the arch in the molar region, or the curve of Spee, in a normal arch the maxillary second molars often have a decidedly distal tip, while the mandibular second molars are inclined mesially. Thus, if the first molars are removed, the maxillary second molars swing down into a more or less upright position while the mandibular second molars tend to tip still more mesially. The broad, flat roots of the mandibular molars, in contrast to the more or less round roots of the maxillary ones are probably also a factor. The denser bony construction of the mandibular alveolus also tends to prevent the mandibular molars from drifting forward in an upright position. I think the general dentist has a much better opportunity than the orthodontist has for studying the migration of teeth when other teeth are missing or when teeth have been extracted. If teeth are missing or have been extracted, and the occlusion has been greatly damaged by this loss, the case is often referred to the orthodontist, while if the spaces have closed up naturally and the patient has an efficient denture, we do not see the case. For this reason, I feel that in discussing this paper on the problem of missing teeth, I know only half the story, or I should say, less than half.

In speaking of facial contour as a guiding factor, whether or not the spaces should be closed, there is one observation that I think might be added. It is this: If posterior teeth are missing, for instance, a second premolar on both sides of the maxillary arch, and the spaces have partially closed up through a mesial or forward drifting of the posterior teeth, the anterior teeth remaining in their normal positions, in my opinion, these spaces can be closed by moving the posterior teeth still farther mesially, and the facial contour will not be changed. In this same case, as I have described it, if we attempt to correct it by moving the molars back and by opening the spaces to their full distance to accommodate a prosthetic restoration, we are much more liable to cause impaction of the third molars (that is if the radiographs show them to be present) than we are if we close the spaces. This question of third molar impaction is one which is receiving more and more attention from our specialty.

A keenly observant general dentist once told me that he had noticed that a far larger percentage of young adults in his practice who had had orthodontic treatment had impacted third molars than those who had had no orthodontic treatment. Of course, orthodontic treatment was not necessarily to blame, as those cases which needed orthodontia might have had impactions anyway. I merely mention it here to stress the point that if we move posterior teeth distally, the position of the third molar is of considerable importance.

There is a type of case with missing teeth with which I have experienced great difficulty. It is one of true distoclusion (the entire mandibular arch being posterior to its normal position) in which the second deciduous molars have well-formed roots. These cases are generally complicated by a deep overbite. I have found that if we leave the deciduous teeth in position and are able eventually to correct the distoclusion and the overbite, the deciduous molars are well below the level of the other teeth, just as Dr. Blumenthal described. This is unsatisfactory, and yet I hesitate to extract these teeth because of the difficulty of closing the spaces. Here is probably a case where prosthetic restoration will be necessary. Perhaps Dr. Blumenthal can help me on this type of case.

I have said previously that we, as orthodontists, have very little opportunity for observing the cases with missing or extracted teeth, where serviceable occlusions resulted. Perhaps for this reason, when we do find partially closed spaces due to missing teeth, we are likely to feel that an appliance is necessary, immediately. I think in these cases when we decide to open the spaces to their full size, our haste may be justified, but when the spaces are to be closed, watchful waiting sometimes accomplishes as much as do appliances.

I should like to show a case which, although I have no other records than a series of models, is interesting to me from many angles. These models are somewhat like a Pirandello play, which often has as many interpretations as there are people in the audience. In showing these models, I am not inferring that any of these cases treated by Dr. Blumenthal

would have taken care of themselves, as I am sure that they would not, nor am I attempting to prove anything except that nature does often take care of spaces, sometimes with surprising results.

Several years ago I was discussing with a general dentist the problem of the loss of the first permanent molars. He asked me if I would examine a case of his in which it had been necessary to extract the mandibular first molars. As you see in Fig. 1, the first premolars on the left side were almost cusp to cusp, and on the right side the mandibular premolar was slightly distal to the maxillary, and there was a very definite labioversion

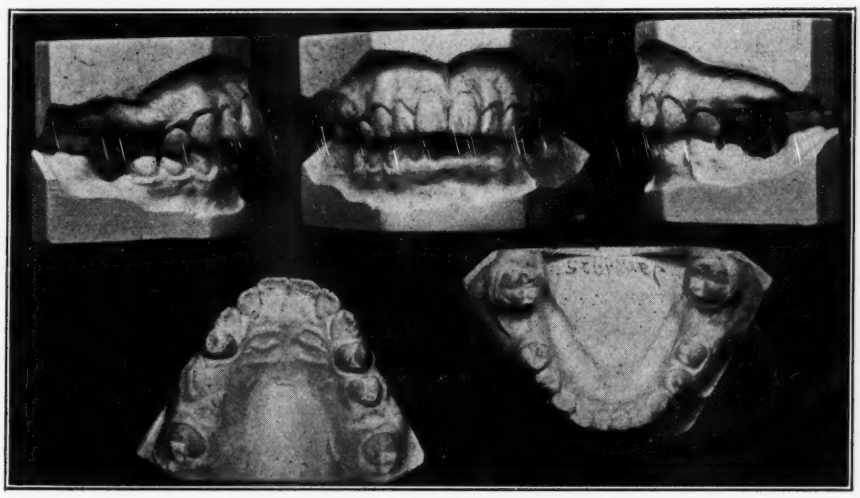

Fig. 1.

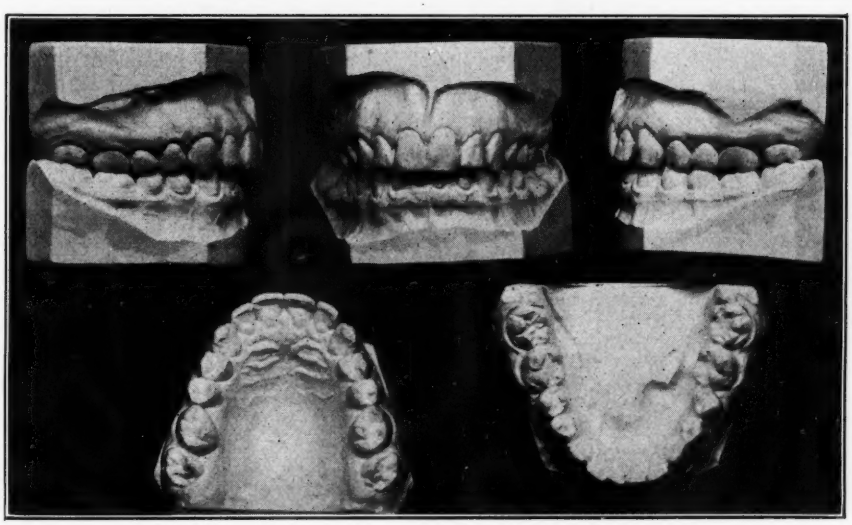

Fig. 2.

of the maxillary anterior teeth. I felt that the loss of the mandibular molars would allow the teeth in front of the spaces to drift distally and the horizontal overbite would become worse. There was a cavity in one maxillary first molar, and so we felt slightly justified in deciding to extract the maxillary molars also. I thought that the removal of the maxillary molars might allow the maxillary teeth to move inwardly. Any orthodontic treatment was out of the question because of economic reasons. The mandibular molars had already been removed. These models were made a short time after the removal of the maxillary molars. This was in January, 1925. The girl was almost twelve years old.

Fig. 2 shows the case as it now stands. The girl is almost seventeen. I did not see her between May, 1929, and February, 1931, when the last impressions were taken. She tells me that the third molars erupted about one and a half years ago, which would have made her about fifteen years old.

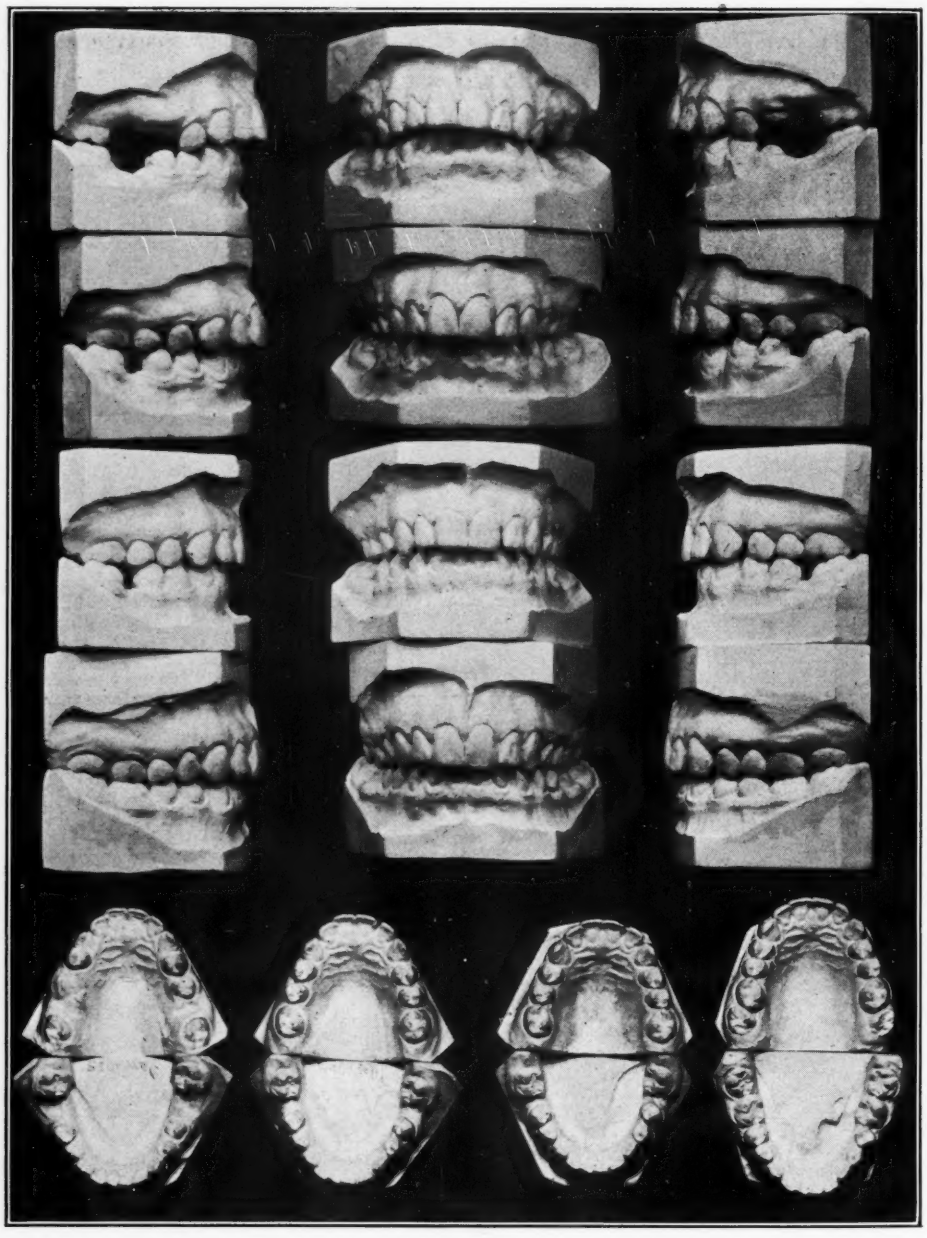

Fig. 3.

Fig. 3 shows a comparison of the four sets of models made of this case ,their dates being as follows: January, 1925; March, 1926; May, 1927; February, 1931. As is usually the case, the maxillary spaces closed much quicker than the mandibular spaces and with less mesial tipping of the second molars. The mandibular spaces apparently did not close until after the eruption of the third molars.

I am sorry I have not a composite map of these four models, as Dr. Stanton has often shown here. I think some interesting comparisons could be made. Some of the changes are

obvious. There has been a contraction of the arch in the molar region, most of which took place the first year after the extractions. There has been a slight increase in width in the maxillary canine and premolar region, or to follow a different line of reasoning, as these teeth moved distally they followed the general line of the arch, and therefore the arch width of their final positions was greater than it was in their original positions. This would also account for the final arch being narrower in the molar region. The mandibular arch in the canine region remained about the same width while it is narrower in the molar region. Notice that spaces opened up between many of the maxillary teeth, and then closed again. While the right second molars seem to have come forward in about the same relation as they were originally, there are undoubtedly bad tips in the mandibular molars, especially on

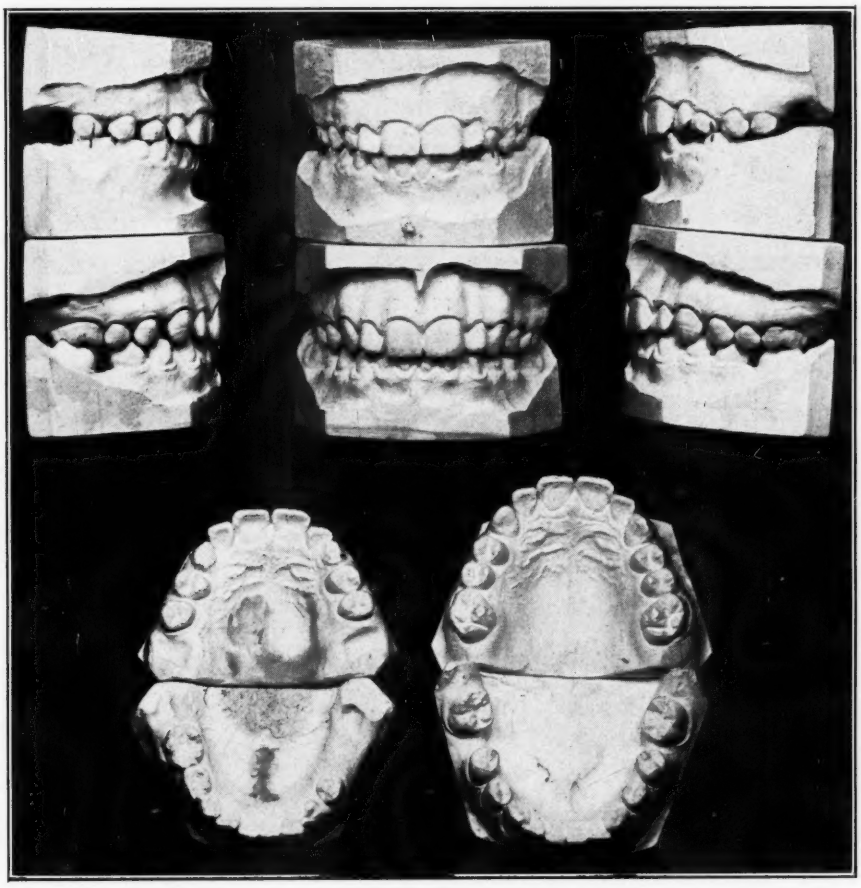

Fig. 4.

the left side. It is interesting to note that the mesial inclinations of the second molars in the final set of models are apparently less than they were in the two previous models. Notice the change in the interrelations of the premolars especially on the right side. How could orthodontia have benefited this case if the girl could have had it done? Personally, I think that by not touching it until the spaces were closed, as they are now, and then by attempting to correct the tips of the mandibular molars. The maxillary molars could have been kept in, and the case could, no doubt, have been corrected. If this had been done, and the spaces for the mandibular first molars had been retained, and prosthetic restorations made, I wonder if the girl would have been any better off than she is today. Please do not forget that the removal of the mandibular molars was necessary.

Fig. 4 shows a case where four permanent molars were removed, but in this case, had the dentist been able to retain the teeth, the boy would undoubtedly have had almost a normal occlusion. The teeth were badly decayed, and root canal work would have been

necessary in three of them. The foramina were still open, and it is doubtful if the most skillful root canal therapy would have been wholly satisfactory. Because of this, it was decided to remove all four teeth and see if the second molars would drift forward. Knowing my interest in the subject of the loss of first molars, the general dentist asked me if I wanted to make a record of the case. When I took the first impressions, I expected some very serious migrations to take place. I was a little surprised when I took the second set of impressions last month. He will certainly never have a normal occlusion, but it is not so bad as I had expected it to be. There is four years' difference between these two models. The facial contour seems to be unaffected and the maxillary spaces have closed, that is, the spaces between the molars and the premolars have closed while spaces have formed between the premolars and canines. These may close up later, just as occurred in the other case.

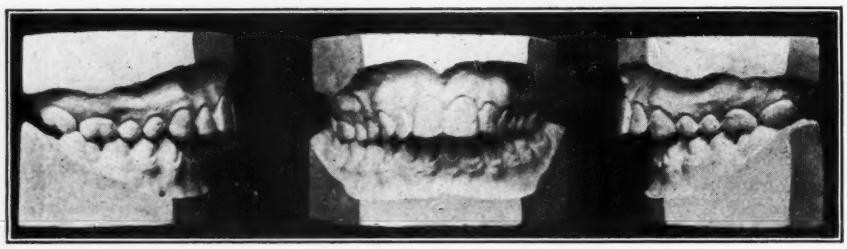

Fig. 5.

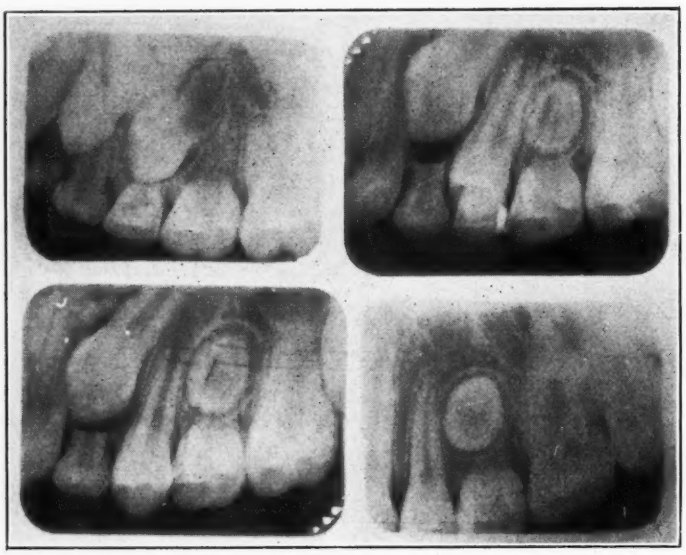

Fig. 6.

The mandibular spaces are closing, but the second molars are badly tipped. I think these spaces may close entirely when the third molars erupt. If the case previously shown is any criterion, there is reason to hope that if spaces do close entirely, the mesial inclinations of the mandibular molars will be no worse than they are now. As I said before, I expected this to be an example of the deleterious effect of extraction on a normal occlusion. Well, it is, but it is not quite so bad as I expected, because of the tendency of nature to close spaces. Because I have shown two cases in which first molars have been removed, I hope that I have not created the impression that I countenance extraction of first molars. We have all seen so much damage done by the loss of these teeth that discussion of it is unnecessary. The question to be decided in this last case was whether to extract and hold the spaces by means of artificial restorations, or to allow the teeth to drift, and the spaces to close. In other words, is a tipped tooth better than a clasped tooth, or one with an inlay attachment? This may

seem to be irrelevant to Dr. Blumenthal's paper, but I do not consider it so. If we, as orthodontists had more records of such cases where extractions were necessary, and orthodontic work unobtainable, because of financial or other reasons, we should be able to make better decisions in our own cases of missing teeth, and we might be of assistance to the general dentist in deciding if compensatory extraction should be done.

Fig. 5 is a case where the loss of the mandibular first permanent molars has caused considerable damage. They were extracted several years before the child came to my office. The spaces have closed, leaving what I consider a rather difficult condition to correct. The second molars have drifted forward, the mesial inclination of the right one being worse than that of the left. All of the teeth anterior to the first molars have drifted distally. Was this a case of distoclusion before the removal of the first molars? The premolars are now in the customary relation of distoclusion, and yet, while the models do not seem to show it very well, the radiographs indicate distal tipping of these premolars, and one can see from this slide the lingual inclination of the mandibular anterior teeth. While I am confident that treatment would be simpler if I open spaces between the second molars and the second premolars, possibly not so much as the full size of the extracted first molars, nevertheless, in order to avoid prosthetic work, I am treating it as a distoclusion case, and I might add, having plenty of trouble with it. I shall be glad to show the result of this case five years from now, be it success, failure, or half and half.

Fig. 6 is a series of radiographs which illustrates a point brought out by Dr. Blumenthal, namely, that when the radiograph indicates a congenitally missing tooth, we must remember the possibility of delayed tooth formation. The first radiographs were taken when the boy was nine years old, showing no sign of a tooth bud, the second two years and five months later showing the beginning of the formation and the third five months after that, and the fourth two years and a half after that, or when the boy was fifteen. On the opposite side, a second premolar is missing.

THE ADVISABILITY OF TREATMENT OF MALOCCLUSION OF DECIDUOUS DENTURES*

By Charles R. Baker, D.D.S., F.A.C.D., Evanston, Ill.

ORTHODONTIC treatment, in my opinion, is logically divided into the following three general classes: preventive treatment, corrective treatment and posttreatment. "Interception of malocclusion" as practiced by Willett, may be entirely *preventive* in character or may be associated with *corrective* treatment. Periods of observation and rest periods during treatment may also be included within the scope of orthodontic treatment.

The fact that malocclusion of deciduous teeth is not a rare occurrence is well known to those who have the opportunity of examining young children.

There are a number of good reasons for correcting malocclusion of deciduous dentures: first, the importance of a normally functioning chewing mechanism during a most important period of growth; second, the effect of the functioning of the teeth on the development of the jaws, adjacent bony structures and the musculature of the face and neck; third, the possibility of normal occlusion of the permanent teeth depends in a great measure upon the two items which I have just mentioned, namely, normal occlusion of the deciduous teeth and normally developed jaws and correlated tissues.

This Society in 1927 passed a resolution which contained the following quotation in regard to the importance of taking proper care of deciduous teeth. "The deciduous teeth should have the same care and attention as the permanent ones, as their maintenance in health is essential to the proper development of adult occlusion." I think that the reference to "maintenance in health" should have included *normal occlusion* of the deciduous teeth.

In view of the generally accepted idea in favor of orthodontic treatment early in the development of the individual, or as soon as abnormal development is apparent, it is difficult to understand why so many orthodontists fail to take advantage of the opportunity of applying this principle.

If our ideas coincide with the statements just made regarding the value of normal occlusion of the deciduous teeth and the importance of early correction of abnormal development, then it must be admitted that certain types of malocclusion which might interfere with the normal occlusion of the permanent teeth and with normal development of the lower half of the face should receive orthodontic treatment. This suggests the consideration of the correct time for treatment.

In order to gain the maximum benefit of orthodontic treatment of deciduous teeth with the intention of producing a normal arrangement of the permanent teeth together with a normal facial development, the best time for

*Read at the Thirtieth Annual Meeting of the American Society of Orthodontists, St. Louis, Mo., April 20-24, 1931.

such treatment is as soon as the roots of the deciduous teeth are fully developed and while there is a minimum of development of the permanent teeth and supporting tissues. Conversely, the movement of deciduous teeth whose roots are considerably absorbed would not be an indication of good judgment, for under such conditions there would be a greater development of the permanent teeth as well as more mature alveolar process.

The roots of all of the deciduous teeth are usually completely developed at the age of three years and their absorption usually begins at about the age of four and one-half years.

Full mouth radiograms should be carefully studied in every case of malocclusion before deciding as to the treatment.

A number of men have stated that they had treated deciduous cases but usually found it necessary to treat the cases again after the eruption of the permanent teeth. Upon further inquiry, it was learned that in many of these cases treatment was applied at an unfavorable time or else the second period of treatment was necessary on account of an injurious habit which had not been corrected or which developed after the first period of treatment. It is quite possible also that the second appearance of malocclusion was not dependent upon or related to the original abnormal conditions or influenced by the first period of orthodontic treatment.

Some orthodontists do not treat these cases because of a possibility of their not being able to do the work properly for such young patients. I am sure that this reluctance is unwarranted, for in my own experience there has been excellent cooperation and splendid behavior on the part of the little children with the possible exception of the first one or two appointments.

There is rarely any objection to the taking of plaster impressions, the fitting, setting and operation of appliances. Parents are easily influenced to have these cases treated when, for example, it is pointed out that it is usually impossible for the permanent molars to assume their normal relations upon eruption unless the deciduous molars are in normal occlusion. Morning appointments can easily be arranged, as there are no school hours to be considered. The child's mother or nurse assumes the responsibility of bringing the patient to the office and also of seeing that the child wears intermaxillary elastics if they are required, so that very few appointments are broken and good cooperation may be expected.

Whether or not orthodontic treatment should be applied in a case of malocclusion is a problem that should be carefully considered after a serious study of all known conditions and etiologic factors.

The question of injurious pressure habits and the correction of abnormal developmental tendencies by the practice of muscle exercises are of particular importance in these young children.

Let us consider the indication for treatment of the following types of malocclusion.

Neutroclusion: (Angle, Class I.)

(a) When the maxillary anterior teeth bite to the lingual of the mandibular teeth.

The patient shown in Figs. 1 and 2 was treated at the age of three and one-half years, in 1910. Treatment was required for only eight weeks. The second set of models was made several months after the work was completed. No further orthodontic treatment was applied, and the third set of models

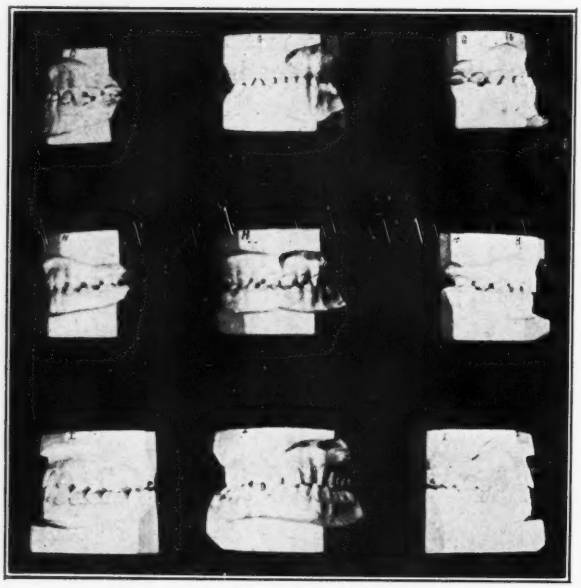

Fig. 1.

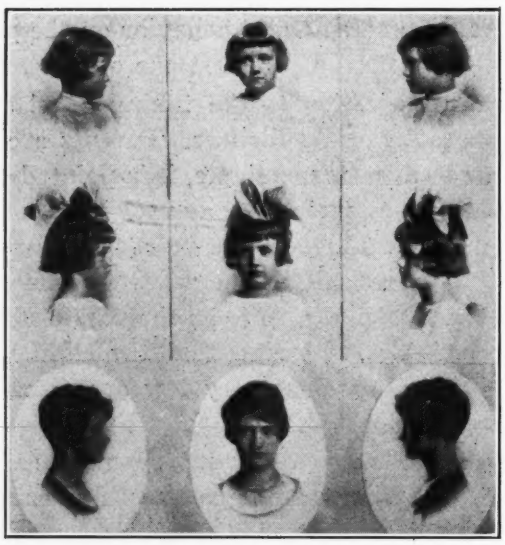

Fig. 2.

was made seventeen years later. The photographs also illustrate the value of the treatment.

In Fig. 3 is shown a case of linguoversion of the maxillary incisors. Although the patient was five years of age, the malocclusion was corrected. However, it was apparent later that the permanent maxillary incisors were not influenced by the movement of the deciduous teeth, indicating that the

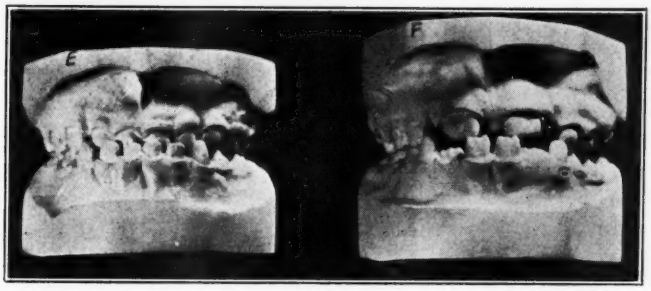

Fig. 3.

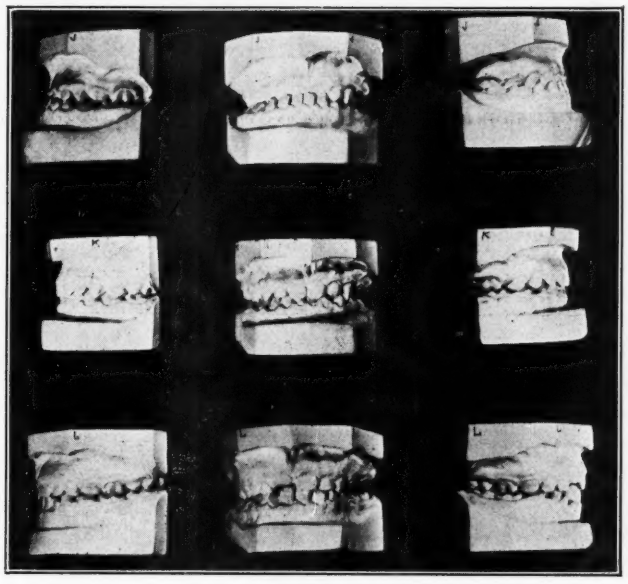

Fig. 4.

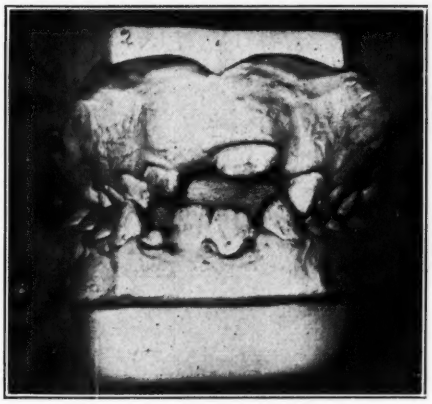

Fig. 5.

treatment was applied at an unfavorable time, after there was too much absorption of the deciduous roots and too much development of the permanent teeth.

(b). When there is a crossbite of the deciduous molars, which may be unilateral or bilateral.

Fig. 6.

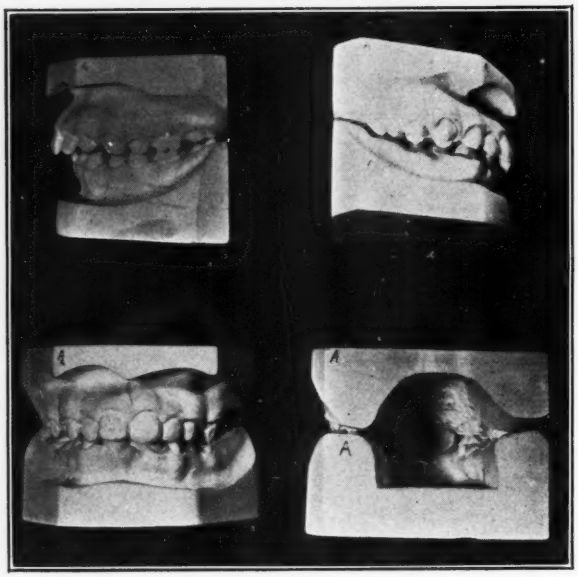

Fig. 7.

I believe you will agree that treatment is necessary in a case of the type shown in Fig. 4 in order to provide a possibility of normal occlusion of the permanent teeth.

If treatment is not applied we may confidently expect a resulting deformity of the type and severity shown in Fig. 5.

(c) When the mandibular deciduous molars are in linguoversion so that they do not occlude with the maxillary teeth. This may also be a unilateral or bilateral condition.

Fig. 6 is surely a case that should receive early treatment in order to establish function to stimulate normal development and to make possible a normal arrangement of the permanent teeth. If such a case is not treated, we may later expect it to be something like Fig. 7.

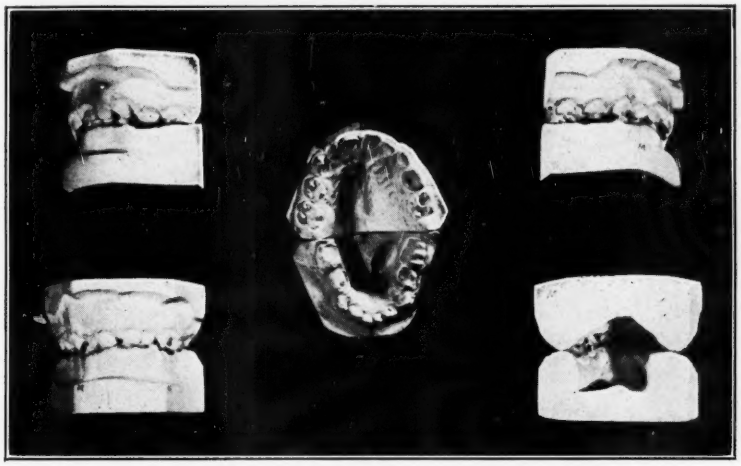

Fig. 8.

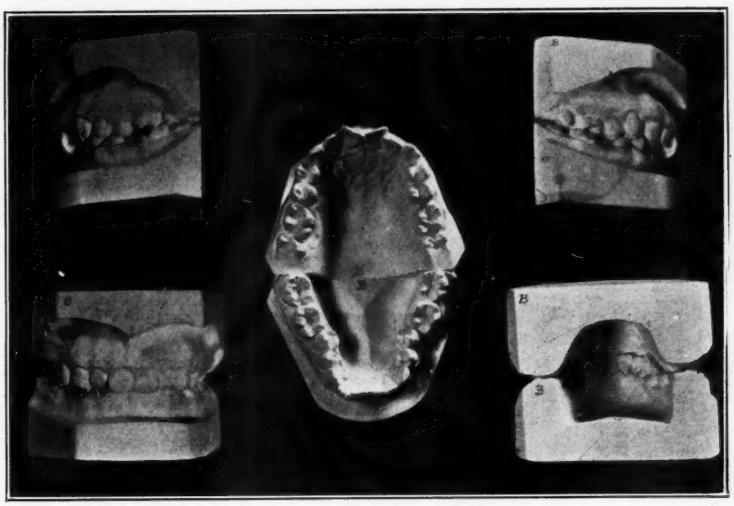

Fig. 9.

If the condition shown in Fig. 8 is not corrected, the malocclusion of the permanent teeth will probably be something like that in Fig. 9.

Distoclusion: (Angle, Class II, Division 1.)

(d) Cases of this type should receive treatment in order to make possible a normal occlusion of the permanent first molars upon eruption and to permit a normal facial development. (Fig. 10.)

Fig. 11 shows an excellent result in a case treated by Dr. R. C. Willett, of Peoria, Illinois.

(Angle, Class II, Division 2.)

In the case shown in Fig. 12 Dr. L. S. Lourie decided to postpone treatment until about the time of the loss of the deciduous incisors and the eruption of their successors. This is excellent judgment in my opinion, for at that time it will be a much simpler operation to correct the mesiodistal arch relationship, the occlusal plane and the overbite of the maxillary anterior teeth.

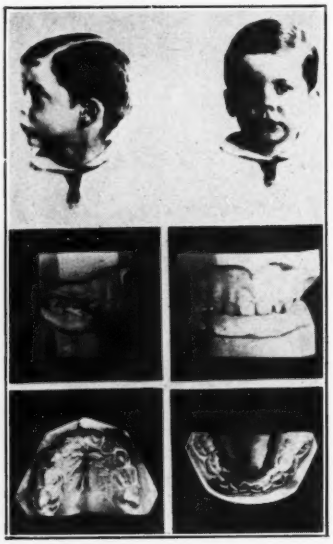

Fig. 10.

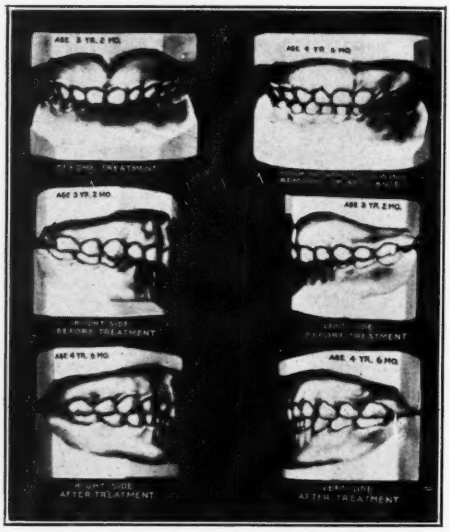

Fig. 11.

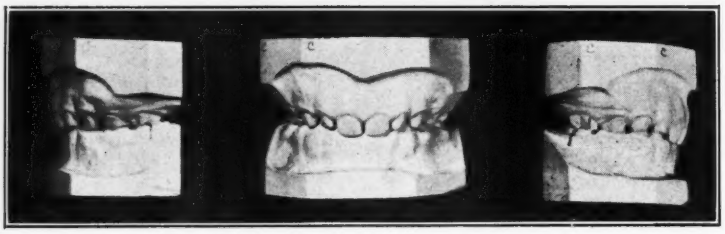

Fig. 12.

Fig. 13.

This is in contradistinction to an Angle, Class II, Division 1 case in which it is necessary to widen the maxillary arch and to move the maxillary anterior teeth lingually.

Mesioclusion: (Angle, Class III.)

(e) Treatment is particularly important in these cases for the same reasons given for the treatment of distoclusion and also because of the progres-

sive nature of the deformity due to the abnormal direction of occlusal force when the teeth are used in mastication or at any time when they are in occlusal contact.

Fig. 13 shows a case from the practice of Dr. William A. Murray, of Evanston, Ill.

(f) Treatment is necessary in cases having supernumerary teeth and cases in which teeth for any reason are missing.

Fig. 14 shows a supernumerary tooth.

Fig. 15 illustrates a case of a missing tooth.

(g) Cases of open-bite also require serious consideration.

The splendid work of Willett in the orthodontic treatment of deciduous teeth, including his success in maintaining arch form, maintaining the correct occlusal plane and in supplying artificial substitutes for teeth should be an inspiration to every orthodontist.

In order to correct a thumb or finger-sucking habit it is sometimes advisable to have the patient wear a fixed appliance which extends laterally across the maxillary dental arch.

Fig. 14. Fig. 15.

Occasionally the use of a bite plane may be indicated in a case of abnormal occlusal plane.

Sometimes the judicious grinding of deciduous teeth, as done by Dr. Lloyd S. Lourie, is of great advantage.

While I appreciate the great value of the work done by that illustrious pioneer in the treatment of deciduous teeth, Dr. E. A. Bogue, I do not believe that we should place too much reliance in mathematical measurements in the problem of diagnosis and plan of treatment.

Until recently it was generally thought that unless spaces occurred between the anterior deciduous teeth at about the age of four years, there would probably be a crowding of the permanent incisors upon their eruption. However, the reports of records made by Dr. Samuel J. Lewis of Detroit, indicate that the jaws grow in width at the average age of about six and one-half years. Orthodontic treatment, therefore, is seldom indicated for the sole reason that these interdental spaces do not occur until a short time before the eruption of the permanent incisors.

The time required for treatment of many of these deciduous cases is only a few weeks and is seldom more than six months, if there is proper cooperation. The pressure applied for tooth movement should be very gentle, particularly in the use of intermaxillary elastics. Posttreatment periods are of short duration.

As stated previously, the importance of the correction of pressure habits and the elimination of any other etiologic factors involved should not be overlooked, for such factors, if active, may cause the rapid relapse of a case.

We know that the prevention and the interception of malocclusion constitutes a great field of constructive work, which is practically untouched by the man in general practice. I also feel that the treatment of malocclusion of the deciduous teeth, when it can be successfully done at the correct time, is a serious obligation of the orthodontist and that this splendid opportunity of correcting abnormal development, as early as such treatment is indicated, should not be overlooked.

DISCUSSION

Dr. J. D. Eby.—Dr. Baker's writings have been the source of a great deal of satisfaction to me. Many times when studying an infant's mouth I have asked myself, what would Dr. Baker decide to do in this case? I know that his beliefs and principles of practice as he has given them to the profession have directed my decision in more times than any other source.

Treatment is by no means the most important part of orthodontia. We have no right to engage a mouth with appliances for three years, for instance, when one year would be sufficient. It is through the exercise of knowledge, experience and foresight that we are enabled to do the least, but the proper thing at the right time, and this makes for ideal treatment. If a given case could be treated half a dozen different ways, some one of them should be the best and that is the one we should strive to find.

But what about diagnosis—that is an entirely different thing. The person who can master the when and how to treat with moderate skill is a better orthodontist than the mechanical genius with beautiful appliances, whose work is not founded on sound diagnosis. The most priceless jewel in the armament of a doctor is his opinion. His skill in the exercise of it is the gauge to his usefulness.

I like very much Dr. Baker's reference to the three phases of treatment, preventive, corrective and post. When pointed out this way it is simple, and is something which even a layman should fully appreciate. Any person with average intelligence can realize that the face is a complex organism composed of many tissues and parts which must continue to develop and change from infancy to full growth. If this is true, then why cannot the same person realize that there must be a great preventive value in early work properly done? This thought imparts a certain philosophy to diagnosis, which takes away the static idea that treatment can be done at any time, or over a blind indefinite period, and substitutes for that the fact that under many varied and changing conditions there is always the best time to do certain work as it may be indicated.

Dr. Milo Hellman expressed a beautiful thought when he stated that we cannot make growth and all that we can do is to guide or direct growth. If this is true, then the far-reaching thought is to do the least we can at the proper time. It is probably the fact in more cases than we realize that this plan should mean treatment at different intervals through the preventive, corrective and post periods if the therapy is correctly applied.

Dr. Baker has stated that infants under the age of five years may be properly handled and treated harmlessly. This is true, but personally I feel a hesitancy toward unnecessary treatment because of the fear of sometimes instilling into some children certain conditions which are liable to leave a lasting impression and seriously affect them in the care of their

teeth in the future. There comes a time in the lives of most children around six or seven years of age when they pass out of the period of intractability and are much more subject to reason than before. I believe there is a period between this and eight or nine years of age when through this span of time the roots of the posterior deciduous teeth will permit of the effective treatment of many conditions which still can be classed in the preventive period.

In referring back to infants younger than five years of age, I have classed the causes of malocclusions found under two headings: habit formed, and those of other origin. I endeavor to consider a habit-formed malocclusion as something that not only will be responsive to treatment but can probably be just as well or better corrected at a slightly older age. These we may call optional cases wherein the matter of judgment would have to be settled by the study of the individual cases. The cases of malocclusion involving function, however, are not optional and must be treated as an act of necessity.

Dr. John V. Mershon expresses well the fact that the face must be considered as a whole, in which every tissue including teeth, bone, muscle, etc., is interdependent. The relation between teeth and the investing bone must be harmonious. If a malocclusion is improperly treated so that the bone does not change in harmony with the teeth, the teeth will relapse back to a state of harmony with the bone. We may thus conclude that inasmuch as form is dependent upon function, in some cases, the preventive value of early corrective measures is indispensable.

THE IMPRESSIONS OF A GENERAL PRACTITIONER OF DENTISTRY AFTER ELEVEN YEARS OF EXPERIENCE IN GENERAL DENTISTRY, UPON THE MUCH MOOTED SUBJECT OF ORTHODONTIA AS RELATED TO GENERAL PRACTICE*

By A. C. Mogler, D.D.S., St. Louis, Mo.

IT IS interesting to observe in retrospect that courses in orthodontia included in the dental curriculum of fifteen years ago were decidedly inadequate and insufficiently extensive to be of very much practical service in so far as the actual treatment and correction of malocclusion are concerned. Most of us will recall very definitely that the perspective which we had in our dental college days on the subject of orthodontia was, to say the least, not an attractive one; it was more or less that of hit-and-miss activity, that is to say, to fix the appliance in place and trust to luck that something would happen. Orthodontia, then, as a subject in the dental schools seems to have left most of us with the impression of its being a subject possibly of an unsatisfactory, indefinite or experimental proposition in practice.

Having been in the general practice of dentistry for some eleven years previous to entering the practice of orthodontia as a specialty, I have had the privilege and opportunity to study, to recognize and to reflect upon what, you might say, is the incomplete or unfinished impression that the student is given in his dental college days, or at least was given in the past. In too many instances, it has been obvious to many of us that the dental graduate of fifteen or twenty years ago has the same idea of orthodontia that he learned in dental college. As a result of my long experience in general practice and later specializing in the practice of orthodontia, I have found that there is perhaps a wider divergence of viewpoint between the specialist and the general practitioner upon the subject of orthodontia than could possibly be true between the specialist and the general practitioner in any other department of dentistry at this time.

It seems to me the training in the subject of orthodontia in dentistry is wholly inadequate even at the present time, either for treatment or for diagnosis of malocclusion. The fundamentals of the subject, the very basic foundation upon which the subject is built, apparently never registered with the majority of us during our dental college training. For instance, and by way of comparison, the orthodontist looks at the mouth with the teeth in occlusion because he knows that the fundamental principle of malocclusion is the question of occlusion of the teeth. Men in general practice, however, are accustomed and, you might say, trained to look in the mouth and at the teeth with the jaws open; we have heard about occlusion, have heard it spoken of and seen it written about very much, but even so it is not taken seriously and does

*Read before the St. Louis Society of Dental Science, September 21, 1931.

not seem to have registered with us in our dental training as it is basicly applied to the treatment of malocclusion of the teeth and dental arches.

Another fundamental point, in my own experience at least, is that malocclusion makes no impression upon the general practitioner unless it is a really marked and outstanding deformity of the teeth and jaws. My own perspective of the subject of orthodontia in general practice was apparently wrong as I view it now in retrospect, from the outside looking in or from the inside looking out, as we might prefer to term the situation.

Another highly important principal of occlusion is occlusal relations of the permanent first molars. How many of us have been accustomed to watch the occlusion of these teeth in the mouths of our patients. What this all means from an orthodontic standpoint is this, that when the occlusion of the first molar teeth is abnormal, there is malocclusion practically over the entire occlusal surface of the teeth.

Another mistake in my view of the subject of orthodontia before I became actively interested in this field was that decayed teeth were caused by loose,

A. *B.*

Fig. 1.—A typical closed bite case to which the general practitioner so rarely pays any attention in so far as correction is concerned. *A*, Before treatment; *B*, after treatment.

ill-fitting, poorly made appliances, and resulted in insanitary conditions of the mouth; that this was a department of dentistry possibly only at its best a partial success was my point of view. The orthodontist has been given credit too frequently and too liberally for the decay of teeth resulting from the use of orthodontic appliances; my own observation in this specialty has been up to the present time that orthodontic appliances rarely if ever are responsible for the decay of teeth if the appliances are properly handled with reasonably careful prophylactic measures; however, when the patient is absent from the orthodontist for two to three months at a stretch, of course orthodontic appliances, being foreign matter, may cause decalcification of the contact surfaces of the teeth. However, teeth have a habit of decaying whether orthodontic appliances are in place or not; but in instances where orthodontic appliances have been used, the appliances usually are conveniently blamed for the malady which has developed (perhaps this is a point peculiar to human psychology, in that orthodontic appliances have acquired a reputation for the decay of teeth which is difficult to offset by careful prophylaxis).

Our past academic training in this subject included the use of the old-fashioned clamp bands known as Lukens, Angle, and Brady, which are now practically things of the past in modern orthodontic technic. These, however, were no doubt responsible for considerable decalcification of the teeth, because these bands were advertised extensively and advocated to be placed upon the teeth without cement under them for a protective measure. In addition to this it is interesting to note that all these clamp bands were designed originally in the city of St. Louis, and invented and patented here, which means they were well known here.

Like every other branch of dentistry, or any other line for that matter, orthodontic technic has shifted and changed, and many of the methods of even five years ago are obsolete today; for instance, the manufactured orthodontic appliances, so-called systems to be purchased from the supply houses, are practically obsolete among modern operators. These appliances have been supplanted by the more modern and carefully constructed type made by a technic which applies pressure and energy to the teeth, constantly, but dis-

A. *B.*

Fig. 2.—Outstanding cases such as this are esthetically displeasing, catch the eye quickly, and the general practitioner insists upon correction. *A*, Before treatment; *B*, after treatment.

tributed in very light doses. Energy applied to stimulate growth in the course of malocclusion, for instance, is now applied only in continuous, constant, carefully determined directions; and the days of intermittent, hit-and-miss energy applied for the growth of osseous tissue are also practically gone.

The laboratory orthodontic appliance has been more or less a detriment to the progress of orthodontia, particularly as applied to the activities of the general practitioner; the reasons for this are apparent. Almost all laboratory appliances are removable affairs, and any general practitioner who has made plates or artificial dentures and finds that the dentures annoy the patient a little, knows exactly where they are worn most of the time (in the patient's pocket). Therefore in modern orthodontic practice practically throughout the country, removable appliances that can be removed at will and leisurely by the patient, are not used, notwithstanding the fact that they are sold by the thousands to the untrained men or amateurs in this field.

It is of further interest that base metals in orthodontic practice, in so far as general use is concerned, are also a thing of the past. Their use has been

discontinued, generally speaking, for two very practical reasons: first, they oxidize and corrode in the mouth, are unclean, unattractive and unsightly; second, the spring, whiplike tension essential in all modern orthodontic appliances is impossible to secure in base metal.

As to the modern laboratory that advertises and proposes a "follow through" on orthodontic cases—this whole gesture is more or less a failure, for all practical purposes at least, because in ninety-nine cases out of a hundred the man who is proposing to "follow through" knows less about the subject of orthodontia than the man he is trying to instruct. This is a broad statement, but it is lamentably true, and seems a rather incredible condition to exist in any profession in the year 1931.

Here, then, is another rather extraordinary situation orthodontically, or it might be called an unusual condition of practice. There are specialists in orthodontia throughout the country, men who have done special work in the field or have devoted sufficient time to this department of dentistry so that they are better qualified to do this class of work than are others. These men as a group practically unanimously point out that there is no place in modern orthodontic treatment for the so-called removable appliances because they are made of base metal and because they are removable by the patient, hence are inefficient, amateurish, and highly impracticable. This group also unanimously deplores the mail-order type of orthodontic treatment, which means the sending of models to a laboratory, the laboratory's constructing the appliances and the laboratory's practically directing the treatment. This type of treatment is being done in thousands and thousands of cases throughout the country because orthodontic instruction in dental colleges is and has been inadequate and inefficient for training dentists to do this type of work. The result is that any port in a storm will do.

After eleven years of general practice I was astonished on entering the practice of orthodontia to find the divergence of viewpoint upon this department of dentistry to be so great among many practitioners. In the physiologic proposition concerning the growth of bone, for instance, most orthodontists do not see their patients for treatment more frequently than once every two or three weeks; nevertheless, the impression seems to prevail that patients should be seen every other day for treatment. As a matter of fact, in the modern conception of this subject to see patients every other day and adjust appliances accordingly is now thought to be one of the most excellent methods of producing traumatic occlusion known to the dental profession.

When I was asked to write a paper on the subject of orthodontia to be presented before this group of general practitioners and before this Society, I was at a loss to know what to write about or what to say. The thought then occurred to me that perhaps a little intimate inside, you might say, of the impressions I have had on this subject of orthodontia since discontinuing general practice might be interesting to you. If I have succeeded in changing your perspective of the whole science and practice of orthodontia this evening from that of traumatic mechanical tightening of nuts and screws, and a proposition of pulling of grassline, if I have been successful in changing that viewpoint to one of growth and development in so far as corrective processes

are concerned, I shall feel that my time has been well spent, because this is exactly what has occurred in my own process of viewing this subject of orthodontia during the last four years.

This is written more, I hope, from the standpoint of the general practitioner, that is, my own viewpoint as a general practitioner, rather than from the standpoint of a specialist. I am convinced beyond any possibility of a doubt that a thorough understanding of the modern concepts, modern ideas and processes in the practice of the science of orthodontia would be a tremendous aid in the everyday work and the perspective of the general practitioner whether or not he includes orthodontia in his practice.

It is fascinating, wonderfully interesting work, and I now firmly believe that its percentage of successes balanced with its percentage of failures will rank as high if not higher than that of any other single department of dentistry, the contrary impression extant notwithstanding.

The paper was then followed by a series of lantern slides.

TREATMENT OF A COMPLICATED FRACTURE CASE WITH ORTHODONTIC APPLIANCES*

By Howard A. Denbo, D.D.S., South Bend, Ind.

THE patient, a young man of about twenty-five years of age, a traveling salesman, had been in an automobile accident, a head-on collision. The patient's car was practically demolished and the patient badly injured. He was taken to a near-by hospital for emergency treatment. X-ray pictures were taken and a report was made as follows: "There is noted a complete oblique fracture of olecranon process of the left humerus. Complete fracture of rami of both sides of the mandible, there is also noted a complete fracture of the mandible anteriorly in the incisor area. The fractures of the mandibular rami are just posterior to the coronoid processes."

No attempt was made at this time to reduce the mandibular fractures. The delay in treatment was due to the bickering of the insurance company as to who should take care of the case and especially as to the fee to be allowed for the services. The patient had been sent to several physicians who would not take the case—efforts were made without success to induce the patient to go to a distant city for treatment.

Four days after the accident the patient was referred to our office for examination. Right and lateral and anteroposterior plates were taken of the jaws, which verified the original hospital report. These showed oblique fractures of the rami and a complete fracture of the mandible beginning inferiorly at the symphysis and obliquely upward through the area between the right lateral incisor and canine.

There was marked misplacement of the mandible backward, downward and slightly to the right. There had been almost a complete reduction of any swelling about the face when first we saw the patient (four days after the accident).

The patient evidently had seen that it was impossible to avoid the crash and had braced himself for the shock, had clenched his jaws tightly with the teeth in occlusion. The terrific impact received on the anterior region of the mandible while the teeth were held locked in occlusion resulted in the shearing off of the distal cusps of the maxillary molars and the mesial cusps of the mandibular molars—the crowns of the maxillary left second premolar and of the mandibular left first and second premolars, and the maxillary right first premolar. The extent and line of this shearing are shown in the schematic sketch (Fig. 2).

The whole distal portion of the maxillary second molar was broken off exposing the pulp.

*Presented at the Thirtieth Annual Meeting of the American Society of Orthodontists, St. Louis, Mo., April 21-24, 1931.

The mandibular right canine, lateral and central incisors with their alveolar process were crushed back to the lingual.

To complicate the case further there was apical infection around the mandibular left molar—also the infected roots of the mandibular left and maxillary right premolars. There was a bridge from the maxillary right canine to the right central incisor—with the lateral pontic. The maxillary left lateral incisor and right second premolar and mandibular right first molar had been extracted some time before the accident. These complicated conditions of the individual teeth and their investing tissues precluded the reduction of the

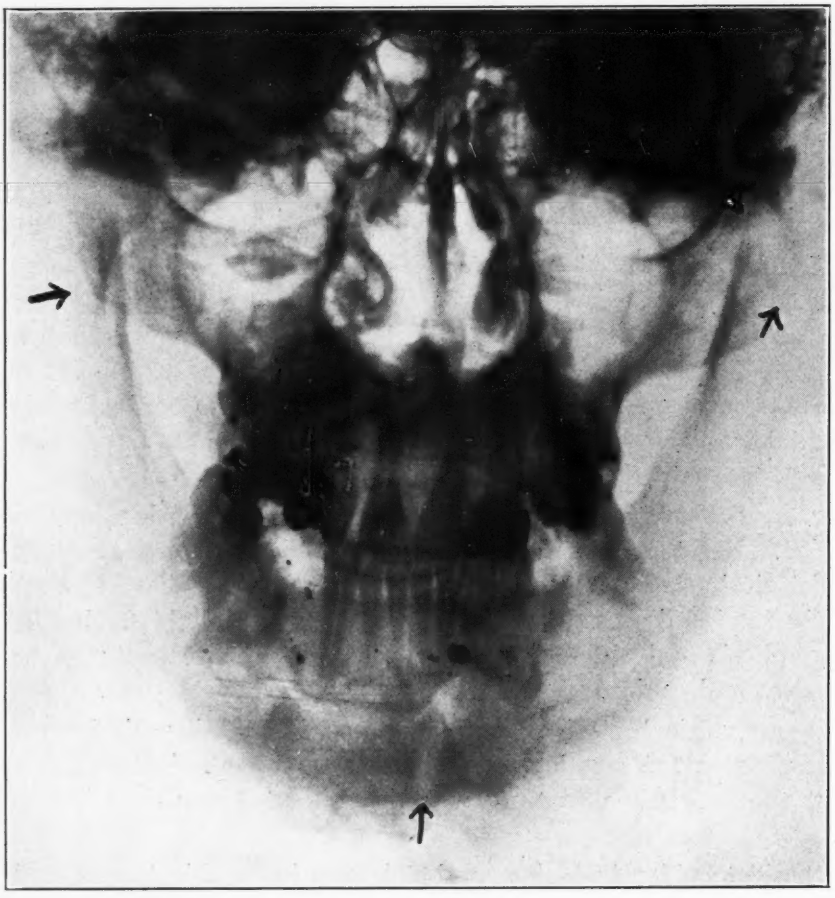

Fig. 1.—Showing fractures of the mandible in both rami and in the symphysis region.

fractures by intermaxillary ligatures alone. Because of the shearing off of the crowns of the posterior teeth, ligatures could not be fastened around the crowns —the condition of the mandibular anteriors and their alveolar process would not permit the use of ligatures, and the possibility of trouble from the infected mandibular left first molar and the premolar roots did not warrant wiring the jaws together, if this could have been done. For these reasons together with the arbitrary attitude of the insurance people regarding the fee the patient had been passed from one man to another then to my associate, an oral surgeon, who recognized that orthodontic appliances must be employed for the successful treatment of the case.

Because of this situation, we protected ourselves by having x-ray pictures made again of the patient and the case diagnosed by the physician's x-ray laboratory. The results of examination, the recommendations, and prognosis were given to the patient.

The patient returned three days later, eight days after the accident. Compound impressions were taken of both jaws. This did not seem to cause any great pain to the patient, who all along gave splendid cooperation. Casts were made of gray vulcanized stone. The lower cast was sawed through at the line of fracture then occluded with the upper cast being guided by the definitely abraided incisal edges of the canines, then mounted on a Gysi articulator. The fight with the insurance people regarding fee continued to delay treatment. Two days later, ten days after the accident, the patient suffered intense pain from the maxillary left second molar with the exposed pulp; this tooth was extracted. Patient was advised to take a saline cathartic.

One day later, eleven days after the accident, the patient returned having decided at last to have the case treated. The treatment and technic of construction of appliances follow that of Dr. O. Ruppreet of Belgium, given at the First International Orthodontic Congress.

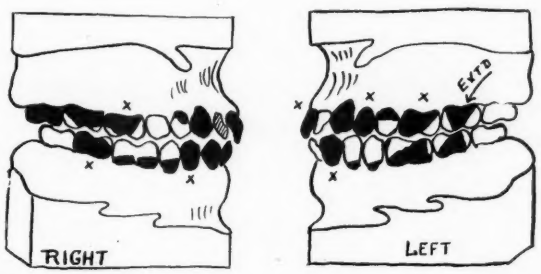

Fig. 2.—A schematic sketch of the teeth. The shaded areas indicate the portions of the teeth remaining after the accident. Light areas indicate lost portions of the teeth, also missing teeth.

The only teeth offering possibilities for anchorage of appliances were in the maxilla: right first molar, left lateral incisor, first premolar, and first molar; in the mandible: right second molar, first premolar and left canine as indicated by *X* in Fig. 2. The bands were made by the direct method and of 0.006 × 0.20 Ney No. 4 band material; compound impressions were taken with bands in place.

Casts were made of gray vulcanizing stone. A labial arch of 14 gauge half-round wire, flat side next to tooth surfaces, was soldered to the molar bands. Small loops were soldered at intervals along this arch wire. Right angle spurs projecting upward were soldered on the maxillary right central and right premolar band; these were to give support to the labial arch. If the arch wire had been soldered to all four bands, it would have been difficult to place the appliance accurately in the mouth. The half-round wire was used to lessen the bulk of appliance.

The lower appliance was constructed of 14 gauge round No. 4 Ney wire. This was made in two sections. The right section was soldered to the second molar and first premolar bands; it extended to left lateral, and at the extremity an upright U spur was soldered.

The left section of the mandibular appliance could be soldered to only the left canine band, this wire extended above and slightly back of and beyond the right section, as is shown in Fig. 3. A small loop wire was soldered near the anterior extremity of each section, through which wire ligatures could be passed to reduce the anterior fracture. There was a distance of about 2 mm. between the appliance and the anterior teeth, when the right anteriors were moved forward to place.

The overlapping portions of the two sections were scarified with a knife-edged file, then coated with zinc chloride. The zinc chloride is made by dropping pure zinc pellets into hydrochloric acid until there is no effervescence, then

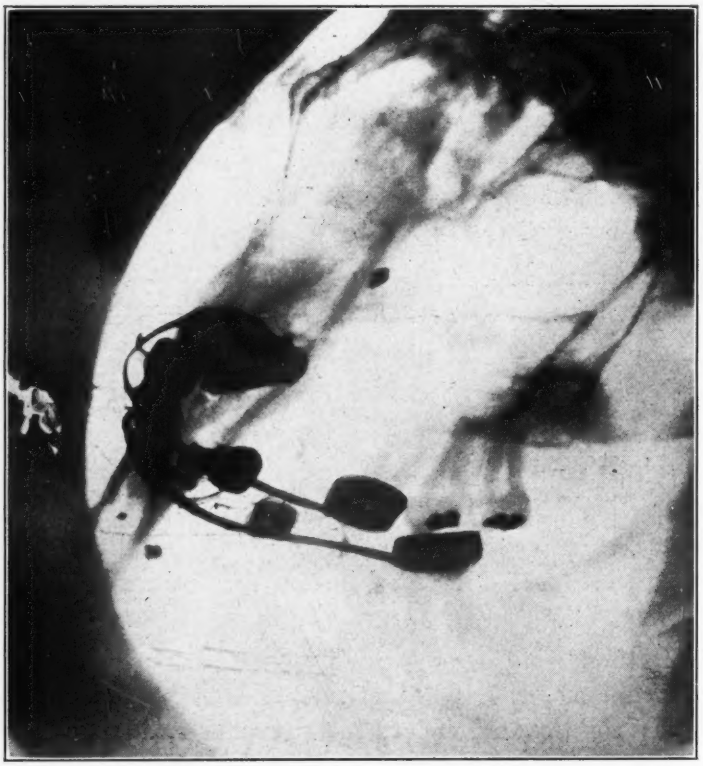

Fig. 3.—Right side fractures reduced and appliances in place.

this is run through filter paper. Next the ends of the two sections were coated thinly with pure tin.

The appliances were then ready to be tried in the mouth.

It is quite evident that it was not necessary to place any separation between the teeth; the accident did that.

The maxillary appliance, attached to the molar bands, was first tried in the mouth and then cemented in place; then the maxillary central and left premolar bands were cemented in place so the arch wire rested snugly within the spurs.

Next the two sections of the mandibular appliances were tried, the right section was placed first, then the left section. The left section lay above and slightly behind and in the U spur on the end of the right section, when the fractured segments had been moved into place.

Next the lower sections were removed, the inside of the bands scarified with a rough stone so as to cause better adhesion of the cement. The right section was cemented in place; then the left section was cemented in place; then the fractured segments were moved into their proper relationships. A brass ligature through the small loops near the ends of each section was used to draw the right and left mandibular segments together to reduce and to hold the anterior fracture. The U loop on the right section was closed over the left section by carefully pinching together with pliers.

Then brass wire ligatures were passed through the small loops on superior surface of lower arch wires, forward and upward through the small loops on the upper arch wire. These ligatures were twisted together, but with no tension.

We are now ready for the reduction of the fractures of the rami. The assistant stood back of the patient and pushed forward and upward against

Fig. 4.—Fractures reduced and appliances in place.

the right and left mandibular angles, as this was done slowly the intermaxillary ligatures were tightened.

This was continued until it seemed that the reduction of the fractures of the rami was complete and the teeth were again in occlusion.

Lateral plate and anteroposterior x-ray pictures were taken to verify the results. Figs. 3, 4, and 5 show all appliances in place, before the lower appliance was soldered.

Next we are to solder, together in the mouth, the overlapping sections of the lower appliance.

Sheets of asbestos paper were cut into 4 inch squares, sterilized in the autoclave, then pieces of this were carefully packed between the mandibular anterior teeth and the lower appliance, between the lower lip and draped over the lips and chin, and between the cheek retractors at the corners of the mouth; the lower appliance was thoroughly dried and moistened with zinc chloride.

A small straight soldering iron was used with a head about 2 inches long and a sharp pointed end; the handle up to the junction with the head was wrapped with asbestos paper to prevent burning the patient and also to facilitate handling the instrument. The iron must be thoroughly cleansed and heated to a temperature slightly above the melting point of pure tin. After each time the iron is held in the flame, it must be rubbed on a piece of ammonium hydrochlorate before picking up the tin. Pure tin nuggets are used as the solder. The heating flame should be close at hand to avoid cooling the iron before it can be used.

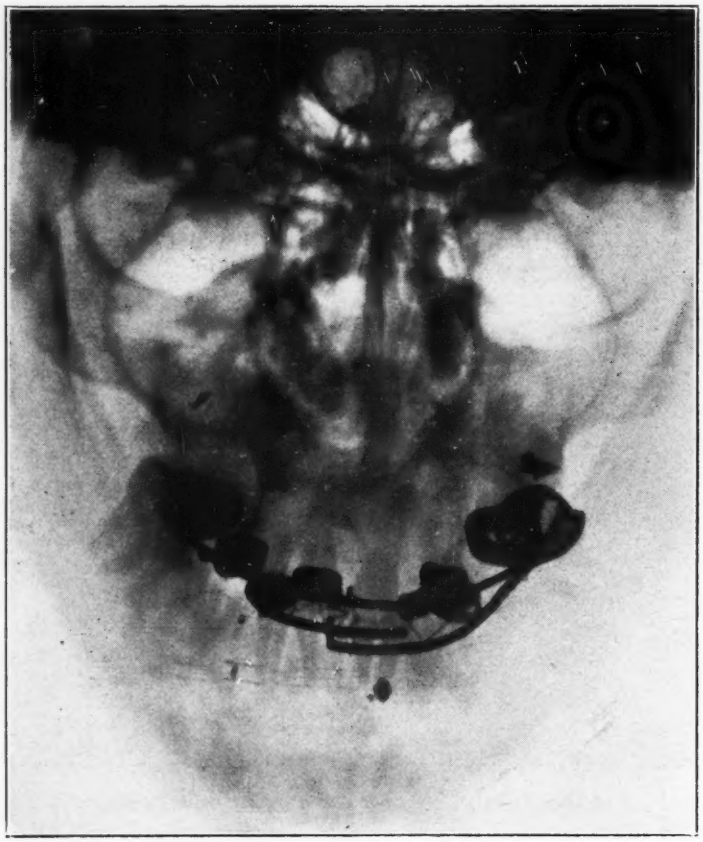

Fig. 5.—Fractures reduced, appliances in place, but lower appliance has not been soldered in anterior region after being placed in the mouth.

Before the iron was carried to the mouth, the patient was asked to keep very still and to close his eyes as, unconsciously, one is very likely to draw away from an approaching hot object.

With the heated iron a bit of the tin is taken up on its point and placed on the overlapping sections of the lower appliance at the point to be soldered. Dry asbestos is kept about the portions of the appliance to be soldered because moisture interferes with soldering.

Then the iron is again heated, care being taken to get it at the correct temperature (not too hot). Pass the iron over the ammonium hydrochlorate and bring the heated iron in contact with the solder already placed on the appliance, as the tin melts its flow can be guided with the tip of the iron.

The case was again x-rayed, and as further protection to ourselves the patient was again sent to the physician's x-ray laboratory for pictures and for a report on the reduction of the fractures.

The patient was given a pair of shears and instructed how to cut the intermaxillary ligatures in case of vomiting.

The patient was seen at frequent intervals to check up on the case, and at the visits the mouth was irrigated with potassium permanganate solution, and the right anterior teeth were brought forward gradually by wire ligatures to the appliance.

The recovery of the patient was uneventful. About three weeks after the reduction of the fractures the patient was again sent to the physician's x-ray laboratory for pictures and received the report—"the films show very excellent apposition of the fragments and good callus formation."

The intermaxillary ligatures were removed after three weeks. The appliances were removed about six weeks after they had been placed in the mouth.

It is felt that in the treatment of all fractures of the jaws, there should be cooperation of the orthodontist, who should be able to construct appliances for the reduction and retention of the fracture that would be more efficient, more sanitary and more convenient to the patient. This is particularly true in cases of the fracture of the mandible—these cases may be treated by orthodontic appliances without intermaxillary ligatures. In all cases of fracture of the jaws, and especially those treated by physicians, it is believed that the cooperation of the orthodontist should insure the restoration of a better functioning occlusion for the patient.

THE TREATMENT OF A VERY UNUSUAL FRACTURE AND THE RESULTS OBTAINED WITH THE AID OF ORTHODONTIC APPLIANCES*

By Guy M. Gillespie, D.D.S., Abilene, Texas

PATIENT: A young man, thirty years old, was in an automobile wreck. He was thrown forward when the car had collided with the other machine. His head came in contact with the cowl of the car, just below the left eye and across his right eye. As result of this terrible blow, the right eye was torn from its socket, and at the same time the nasal bones were driven backward. The superior maxillary bones were broken and driven upward and backward,

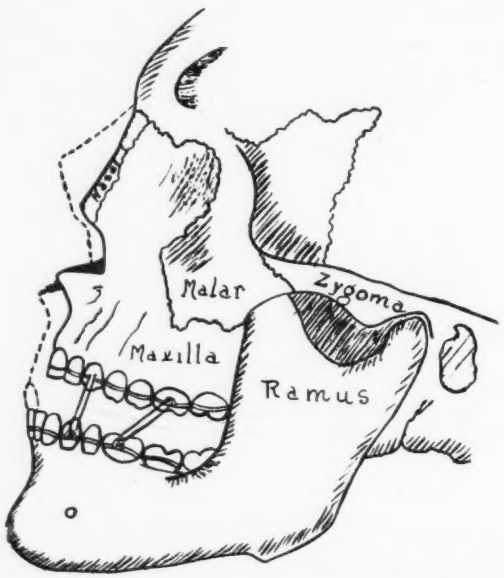

Fig. 1.—Shows the relation of the maxilla to the mandible after the fracture.

and so great was this force that these bones were lodged between the zygomatic and malar bones which came in with a spring force, and at the same time they were driven into the upper portion of the face, as shown in Fig. 1.

A dental surgeon was summoned, and while the eye (which was lost from the blow) was being removed under a general anesthetic, he and his assistant tried to move the broken bones into their proper places. This, however, could not be accomplished at this time without considerable laceration to the tissues and surrounding structures. The patient suffered considerable shock from the removal of his eye, and as result of this it was several days before I saw him in consultation with the dental surgeon.

*Clinic presented at the Thirtieth Annual Meeting of the American Society of Orthodontists, St. Louis, Mo., April 21-24, 1931.

Upon complete examination, I found that the patient could not get his teeth together, and in fact there was a space between his maxillary and mandibular teeth large enough for him to place his first and second fingers and

Fig. 2.—Lateral view of head showing the distance between the maxillary and mandibular anterior teeth.

Fig. 3.—Lateral view of head showing the appliances in place and the space between the maxillary and mandibular teeth reduced.

thumb. The nasal passages were occluded to such an extent that breathing was almost impossible through the nose. There was a protrusion on the upper right side which upon palpation, felt as though the zygoma on that side was

considerably out of line. X-ray pictures, however, only showed the bone to be broken in the frontal portion, Fig. 2.

After a brief discussion of the case with the dental surgeon in charge, also after futile attempts to dislodge the bones, we decided to place orthodontic appliances on the patient and attempt to move the bones downward and forward with constant pressure, which we could get with intermaxillary rubbers and which we could not get with wires.

The physical condition of the patient, however, had to be taken into consideration, because as stated before, he suffered considerable shock, and almost died on the operating table when the general anesthetic was administered. The patient therefore was considerably perturbed as to the outcome of another anesthetic, and the attending physician, realizing this anxiety, at once began another routine for the administration of a safe and complete anesthetic, which was accomplished with novocaine and block anesthetic.

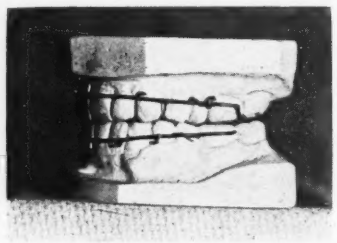

Fig. 4.—Showing the relation of the jaws after the fracture was reduced, together with the appliances in place.

In this particular case we did not atttempt to place bands upon the teeth, which as a rule is the first consideration, but made our appliances to conform to the necks of the teeth, and on these we placed hooks from which we ran intermaxillary rubbers. The appliances were stabilized by wiring them to each of the teeth in the upper and lower arches and worked very nicely, as shown in Fig. 4. Two intermaxillary rubbers were placed on each side, one pulling directly downward and the other pulling forward, and several days later we placed two additional on the anterior teeth. This continuous force moved the bones into their proper position in approximately three weeks' time, and at that time we stabilized the fracture with intermaxillary wires. The patient was left for four weeks, and then the appliances were removed. I hardly see how we could have obtained the results with this case had it not been for the intermaxillary rubbers exerting their constant pressure in the direction they should to reduce this fracture.

INVERTED TEETH

By W. G. Hughes, D.D.S., Walla Walla, Wash.

CASE 1 is of a boy six years of age, who presented with two missing deciduous maxillary incisors. The rest of his teeth were in fine condition except for a lack of development in the incisor region. Radiograms of the missing central incisors showed them to be inverted and without any roots at this time (Fig. 1). They were removed without any trouble by making a small incision in the gums over each tooth and lifting them out with a small spoon elevator.

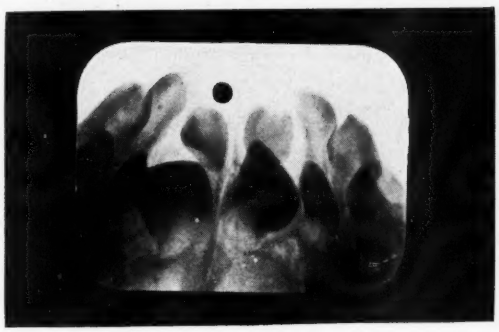

Fig. 1.

Fig. 2.

Fig. 1.—Showing unerupted inverted deciduous incisors blocking eruption of maxillary incisors.

Fig. 2.—Showing inverted, fully developed second premolar.

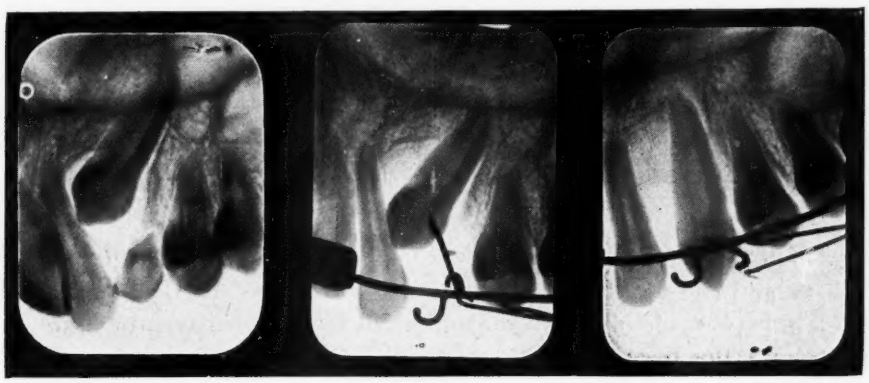

Fig. 3.—Showing impacted canine and appliance used to bring it into normal position.

CASE 2 is of a young girl fifteen years of age. The second left premolar is inverted and the root well developed (Fig. 2). Nothing has been done with this tooth. The mandibular second premolars and second permanent molars are missing. The maxillary right canine was impacted lingually and was brought into position as shown in Fig. 3. The first was taken March 20, 1929, the second November 20, 1930, and the third April 6, 1931.

Cases such as these must impress upon orthodontists and dentists the importance of using radiograms as an aid to diagnosis. In radiography we have a penetrating eye; let's keep it open.

DEPARTMENT OF
ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

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DIAGNOSIS AND TREATMENT OF CHRONIC OSTEOMYELITIS OF THE MAXILLA INVOLVING THE MAXILLARY SINUS

By Sterling V. Mead, D.D.S., Washington, D. C.

IN 1929 I made a report of one hundred cases of a type of bone disease not clearly defined in any of our present dental literature. I chose to call this type of bone disease primary chronic osteomyelitis because the microscopic studies of the affection revealed a picture of osteitis and osteomyelitis of a chronic nature where there was no clinical picture or history of a previous acute bone condition.

A primary chronic osteomyelitis differs entirely in symptoms and treatment from the chronic type of osteomyelitis following the acute type of osteomyelitis. I feel sure that many men are operating upon this type of disease but not necessarily recognizing it under the same nomenclature. Many operators confuse this type of bone disease with other forms of bone disease.

This paper is written as the result of a study of a series of fifty cases of this particular type of disease of the maxillae involving the maxillary sinus. Careful laboratory checks have been made of these patients, and the oral conditions and the general physical condition have been kept under careful observation.

Diseases of the maxillary bones are acute and chronic in their manifestations, infectious or noninfectious, suppurative or nonsuppurative.

Inflammatory reactions of the bone may be classified according to the anatomic situation of the lesion into three divisions:

1. Periosteitis, inflammation of the surrounding membrane of the bone or periosteum.

2. Osteitis, inflammation of the bone structure proper.

3. Osteomyelitis, inflammation of the medullary cavity.

It is important to realize that in practice no such definite anatomic limits to the inflammation exist. Where the periosteum is inflamed, the under-

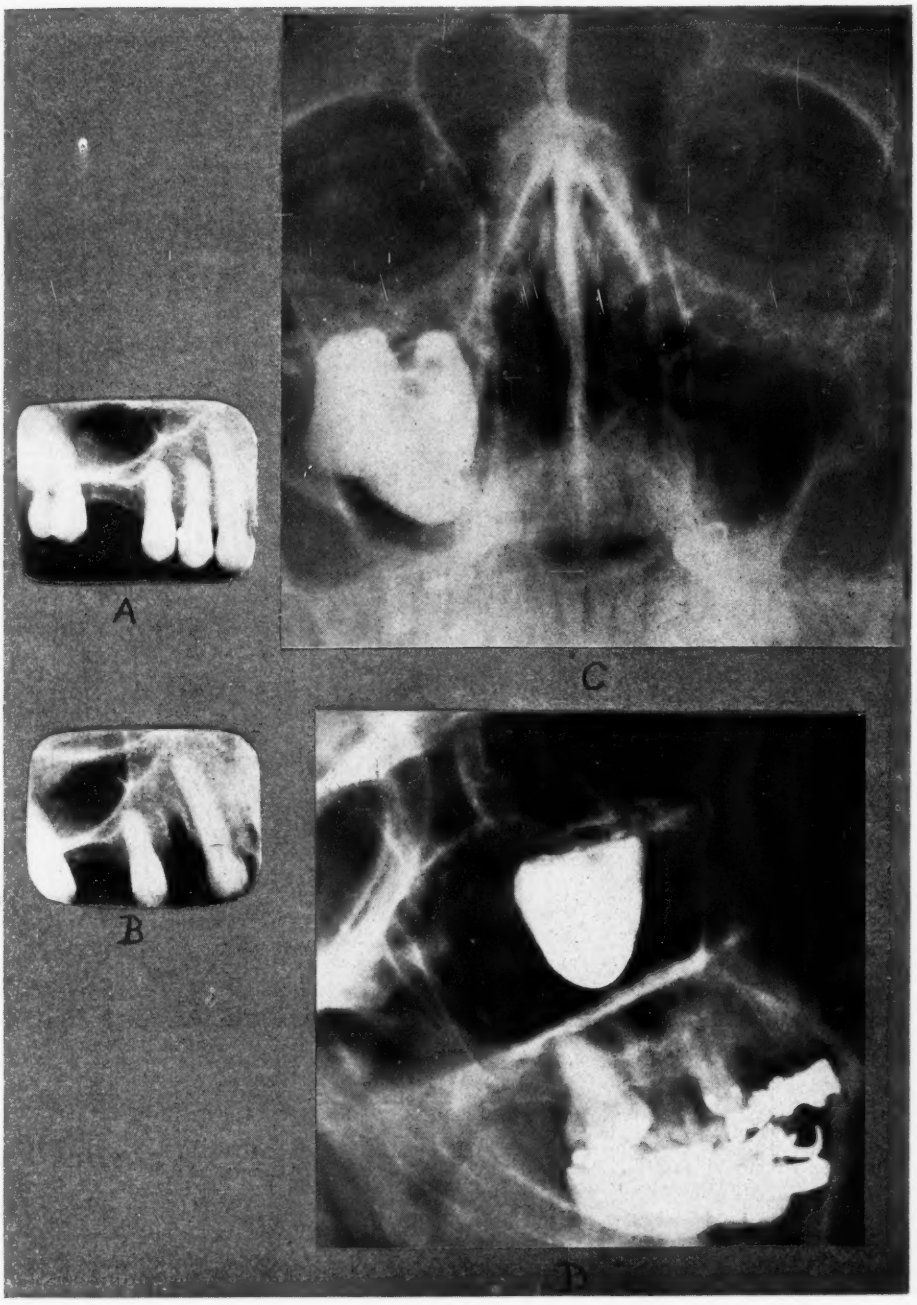


Fig. 1.—Mrs. Mc.K. *A*, Intraoral roentgenogram taken in June, 1929. No definite pathologic bone change is shown. *B*, Intraoral roentgenogram taken September, 1929. No definite pathologic bone change is shown. The socket from where the first premolar was removed has not yet regenerated. *C*, Anteroposterior extraoral roentgenogram with lipiodol injected into the maxillary sinus showing an area of lessened density in the floor and sides of the maxillary sinus. This was due to hyperplastic tissue, resulting from chronic inflammation associated with chronic osteomyelitis. *D*. Lateral extraoral roentgenogram with lipiodal injected into the maxillary sinus showing an area of lessened density in the floor and sides of the maxillary sinus. This was due to hyperplastic tissue, resulting from chronic inflammation associated with chronic osteomyelitis.

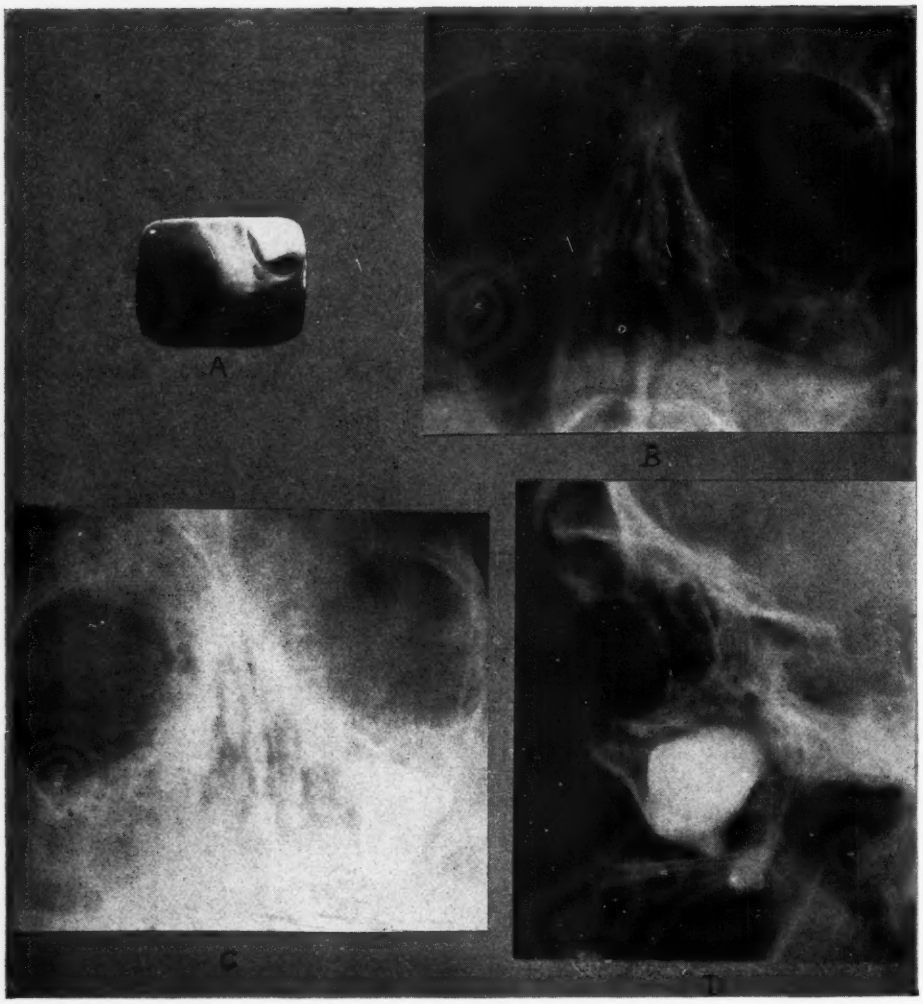


Fig. 2.—Case of Mr. S. Complained of a vague, indefinite radiating pain in the region of the left maxillary sinus. *A*, Lateral intraoral roentgenogram showing impacted left maxillary third molar. There is an increased density surrounding this tooth with a loss of the line of periodontal membrane and suggesting a pathologic condition. An area of lessened density is shown in the floor of the sinus below the lipiodol which was injected into the sinus. This area of lessened density is due to chronic hyperplastic inflammatory tissue in the floor of the sinus adjoining the impacted tooth. *B*, Anteroposterior extraoral roentgenogram of the maxillary sinus before the injection of lipiodol showing an area of increased density due to hyperplastic, inflammatory tissue in the sinus. *C*, Anteroposterior picture with lipiodol injected showing an area of lessened density around the sides and floor of the maxillary sinus due to hyperplastic chronic inflammatory tissue. *D*, Lateral extraoral roentgenogram showing impacted tooth and area of lessened density in the floor and sides of the maxillary sinus due to the chronic hyperplastic tissue. Two incisions were made in the mouth, and the buccal tissue was reflected. The impacted tooth removed and the diseased bone removed with an opening directly into the maxillary sinus. The sinus was cleaned of all pathologic tissue through this opening. In this particular case, had the impacted tooth been removed by the oral surgeon without attending to the maxillary sinus, the condition would not have recurred. On the other hand, if the rhinologist had removed the pathologic condition of the sinus without attendng to the impacted tooth, the pathologic condition would have recurred.

lying bone is always affected to a greater or less extent, while disease involving the medullary cavity invariably affects the bone surrounding it. In a similar way, if the bone itself is first affected, either the periosteum or the medullary cavity, or both, is soon involved.

The phenomena of bone disease are much the same as in other structures except that the death of the bone is more likely to occur owing to the unyielding character of the canals through which the vessels run. Inflammation of bone may terminate in resolution, hypertrophy, hyperplasia, atrophy, or resorption of the part.

Inflammatory processes in the bone are characterized by a primary activity of the blood vessels, red and white blood cells and the fibroblasts; or, by secondary involvement of that portion of the bone which contains the calcium salts, the bone lamellae or bone units.

In the uncomplicated forms of inflammation or osteitis the areas affected become more vascular, the bony spaces increase in size and number and become filled with granulation tissue. Osteoblasts and osteoclasts then make their appearance, the first taking part in the formation of new bone lamellae and the other absorbing and moulding the entire field of involved tissue.

Osteitis may be of the generalized type caused by diet deficiencies or diet disturbance, by drugs or systemic disease. The localized type may result from trauma, disuse, pressure, chemicals or bacteria. An osteitis may occur as a resorption or atrophy or it may occur as a hyperplasia or hypertrophy. Some authorities divide osteitis into rarefying osteitis and condensing osteitis. Various terms have been given by different authors as synonymous for rarefying osteitis, such as osteoporosis, atrophy, caries, necrosis, etc.

Osteoporosis is described by many authors as that type of bone disease seen in the senile and it may follow prolonged disuse, continual nutritional disturbance, trophic changes, wasting disease, phosphorus poisoning, etc.

Pollia in his work has classified all types of rarefying osteitis under the heading of atrophy. I prefer, however, to limit atrophy to that particular form or change shown in the senile, that type caused by disuse (whether it be an area under a bridge, or where there has been a loss of teeth, or whether it be the entire mandible, where it has not had proper function), or those types due to continual nutritional disturbance, trophic changes and wasting disease, injury or pressure. It is normal in old age, an example of which is the mandible.

There are types of bone disturbances where the diagnosis is made upon the roentgen-ray findings where there is a change from the normal picture of the bone cells to the abnormal one. There may not be necessarily any apparent change in the size and shape of the particular part, but the cellular structures are altered in size and appearance.

Caries is a term quite often used by the physician to designate rarefying osteitis. Caries is a piecemeal, molecular disintegration of the bone.

Various terms have likewise been given by different authors as synonyms for condensing osteitis, such as hypertrophy, hyperplasia, osteosclerosis, etc.

I prefer to use the term hypertrophy to designate a particular type of disease where there is an increase in the size of the part involved. I prefer to use the term hyperplasia in those cases where there is a change in the cellular uniformity or cellular structures, but not necessarily any change in the structure as a whole. I believe that practically all forms of condensing osteitis are pathologic, but I do not always advocate operative procedures for correction. In the repair of fractures, there is an increase in the density, or in reality a condensing osteitis at the site of injury; but this is not necessarily pathologic bone requiring any treatment or surgical interference.

In bone hyperplasia there is a substitution of a condensing type of bone for the normal characteristic bone. Hyperplasia of the bone may be produced by infections or by thermal, defensive and traumatic injuries.

It has been my clinical experience that there is a type of condensing osteitis or hyperplasia that is the result of infection and where this can be definitely determined, it should be removed. This type of hyperplasia is usually somewhat chalklike and not extremely dense. On the other hand, there is a type of condensing osteitis or hyperplasia often called bone whorls that may occur in isolated positions in the bone, or may occur at the apices of roots as a result of irritation from fillings, traumatic irritation, etc. Clinical experience often proves that these areas are extremely dense and hard and their removal is attended with a great deal of injury and disfigurement of the parts, and in this particular type of hyperplasia there does not appear to be any systemic improvement after removal. Where I can definitely diagnose this particular type of condensing osteitis, I do not advocate surgical interference. In some particular cases it is impossible to differentiate between these two types of condensing osteitis without exploratory operation.

Infected hyperplasia is a condensing osteitis or a substitution of the condensing type of bone for normal bone due to the successful invasion of bacteria. This is characterized roentgenographically by an abnormal number of bone lamellae to a particular area and has an appearance of a white sclerotic spot or area.

Thermal injury is a type of slow low grade irritation due to shocks from extreme hot or cold substances coming in contact with the tooth, or by injury of pulp of the teeth by extreme temperatures being carried to the pulp. Thermal injury also occurs as a result of static influences by contact of one type of filling with another of different polarity. Repeated shocks to the pulp will cause injury of pulp causing pulpitis, pulp stones, and in some cases death of the pulp. In the beginning stages of this type of irritation the roentgenogram will disclose the area of hyperplasia immediately at the apex of the tooth.

There are certain abnormal areas in the bone that show definite areas of resorption or osteoporosis surrounded by a circumscribed area of condensation or hyperplasia. There are instances of defensive hyperplasia. The central area is found to contain granulomatous type of tissue and the surrounding condensed portion to be a dense, hard, limiting wall. There is a difference of opinion as to the significance of this type of hyperplasia. Dr. Price

feels this shows a lowered resistance of the patient to the invasion, while many other authorities feel that the area of hyperplasia is due to a higher resistance of local tissue at this area to the spread of infection and is a limiting wall with decreased virulence of organism at this point, or a higher tissue resistance.

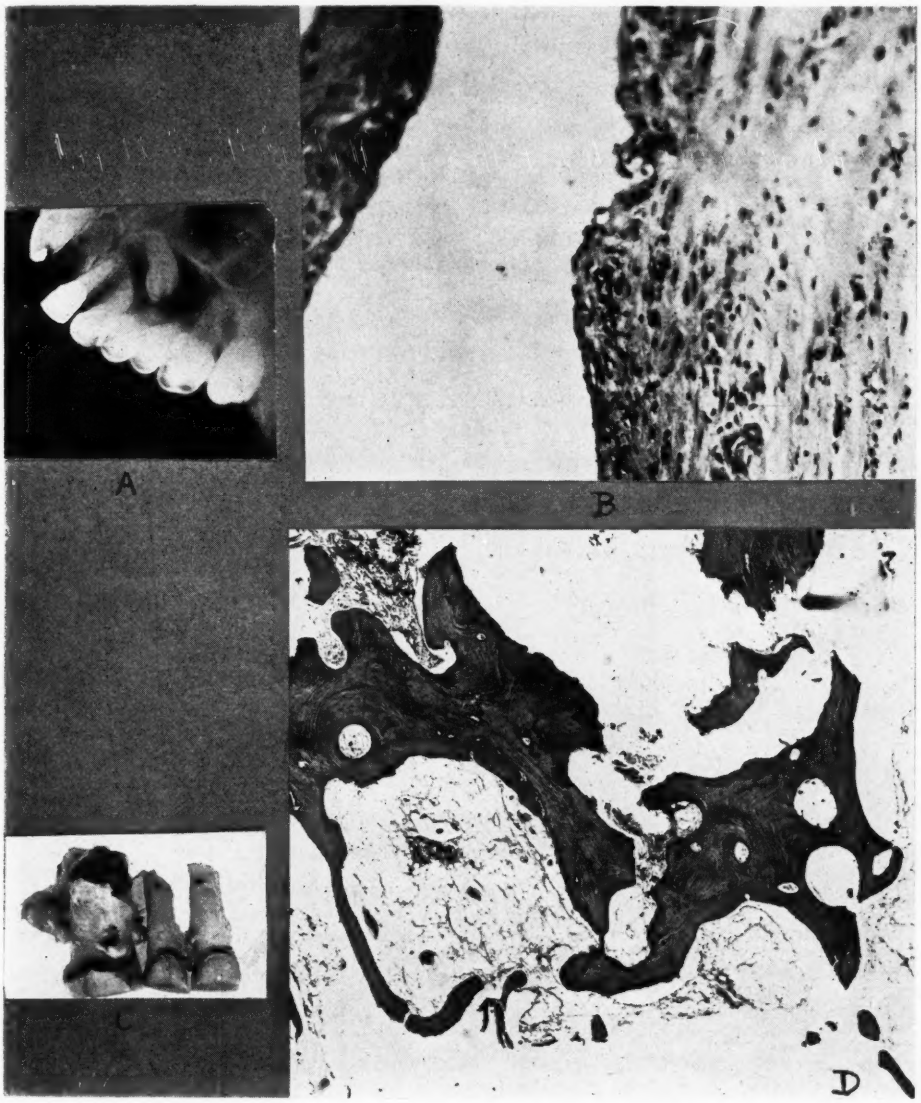


Fig. 3.—Case of Dr. H. *A*, Intraoral roentgenogram shows follicular cyst in the right maxillary premolar area. The teeth all appear to be vital. In removing this cyst an area of chronic osteomyelitis was found distal to the cyst over the first molar area. *B*, Photomicrograph (x275) taken from the cystic area shown in *A*. *C*. Photograph of premolar and molar teeth with diseased bone attached to the teeth. *D*, Photomicrograph of diseased bone attached to teeth showing chronic osteomyelitis in the region of the floor of the maxillary sinus.

Traumatic hyperplasia is often found around molars in hyperocclusion. The continued stimulation being a mild type of irritation will cause a hyperplasia or condensation of the bone at the apex or apices of the teeth involved.

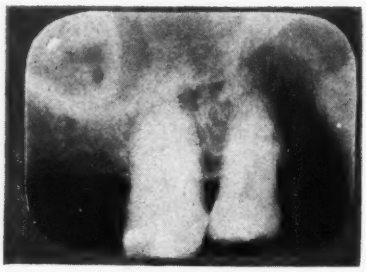
Hyperplasia therefore may vary from a small insignificant thickening of bone at the periapical opening and vary in intensity from a soft spongy mass

to that of a hard, ivorylike substance. It has been my experience that the infective type, however, is more or less limited to softened or chalklike density and that the more dense ivorylike areas are of a noninfective type and probably due to a traumatism or irritation.

It occasionally happens that an area of resorption later takes on a different appearance, and instead of continual bone resorption the process changes to one of bone condensation, so that the area may have the appearance of bone resorption and condensation, or one of these areas predominating, depending upon the time of infection, resistance, etc.

Hypertrophy of the bone may be congenital. Under this type would no doubt come many of the bony growths, such as torus palatinus, and those oc-

Fig. 4.



Fg. 5.

Fig. 6.

Fig. 4.—Mr. D. Intraoral roentgenogram showing sclerotic area in the left maxillary second molar region due to chronic osteomyelitis.

Fig. 5.—Case of Mrs. L. Lateral intraoral roentgenogram showing right maxillary second and third molars. These teeth tested vital and did not show any definite pathologic change in the surrounding bone. Clinical examination showed congestion and pus immediately over the apices and between these teeth. There were trismus and other symptoms of inflammation present. These teeth were removed and the bone surrounding them showed a definite honeycombed condition and the presence of chronic osteomyelitis.

Fig. 6.—Case of Miss McA. Lateral intraoral roentgenogram showing caries in the left maxillary third molar. The line of periodontal membrane can be followed around the apices of the roots, but there is a questionable rarefied condition along the floor of the sinus. This proved to be chronic osteomyelitis extending into the maxillary sinus.

casionally seen on the lingual surface of the bone opposite the mandibular premolars and in other positions in the mouth. Hypertrophy may be due to increased use or overuse; it may be due to nutritional disturbance or as the result of inflammation.

Other examples of generalized hypertrophy are leontiasis ossium, which is a progressive hypertrophy of bones of the skull, acromegaly, Paget's disease, etc.

Quite frequently it happens that instead of bone formation or bone destruction, there is a simultaneous or balanced activity of both bone destruction and bone formation.

BONE VARIATIONS IN EDENTULOUS AREAS

Edentulous lesions are not uncommon in the work of the oral surgeon who is interested in the removal of foci of infection. Many of these conditions are plainly discernible in the roentgenogram, and in others an exploratory incision is necessary to confirm the suspicion of infection or to make a final diagnosis. There are many men who are overzealous in their work and interpret all suspicious areas as evidence of definite infection, but on the other hand, there are many men too conservative and who fail to remove definite areas of residual infection by feeling that an exploratory incision is not indicated as a method of diagnosis in any case.

Particularly after the removal of teeth, it is difficult to determine whether there is residual infection. It must be remembered that it takes a certain length of time for complete regeneration of these areas. It may take six months to a year and in some unusual cases longer. It is necessary therefore to have an arbitrary interval of time, and Pollia suggests two years as a maximum time when the regenerative process should be complete, and after this time any irregularity should be considered pathologic. Due to the fact, however, that patients suffering with systemic disturbances must often remove any doubt without delay and where the symptoms of any disturbance point to an infected process and all other facts having been eliminated, it is necessary occasionally to make exploratory incisions on suspicious areas to prove or disprove the presence of infective conditions.

ROOTS AND ROOT FRAGMENTS

Roots and root fragments remaining in the bone after the removal of teeth should be considered as foreign bodies. Their reaction in the tissue is the same as a foreign body, and my experience has been that practically all roots sooner or later are the source of irritation and infection.

The roentgenogram is very useful in the discovery of roots and root fragments and in many cases will show definite evidence of bone change, and there may be a variation in the size and number of the bone cells, but the fact that no definite evidence of pathologic change is disclosed by the roentgenogram is not conclusive evidence that there is no disease present.

There are a number of authorities who feel that there is no reason to suspect these roots of being the source of infection unless bone changes can be shown in the roentgenogram. I do not believe that this can be borne out by clinical experience. These authorities often feel that as long as the black line of the periodontal membrane and the white line of the periodontal lamella can be discerned, it is best to leave the roots undisturbed.

A retained root fragment may be surrounded by a circumscribed or diffuse area of rarefaction as shown by the roentgenogram, or in some cases

these roots are surrounded by an area of condensation. In some particular cases it is extremely difficult without an exploratory incision to determine whether the area of increased density is an area of sclerosis or whether the area involves a root fragment.

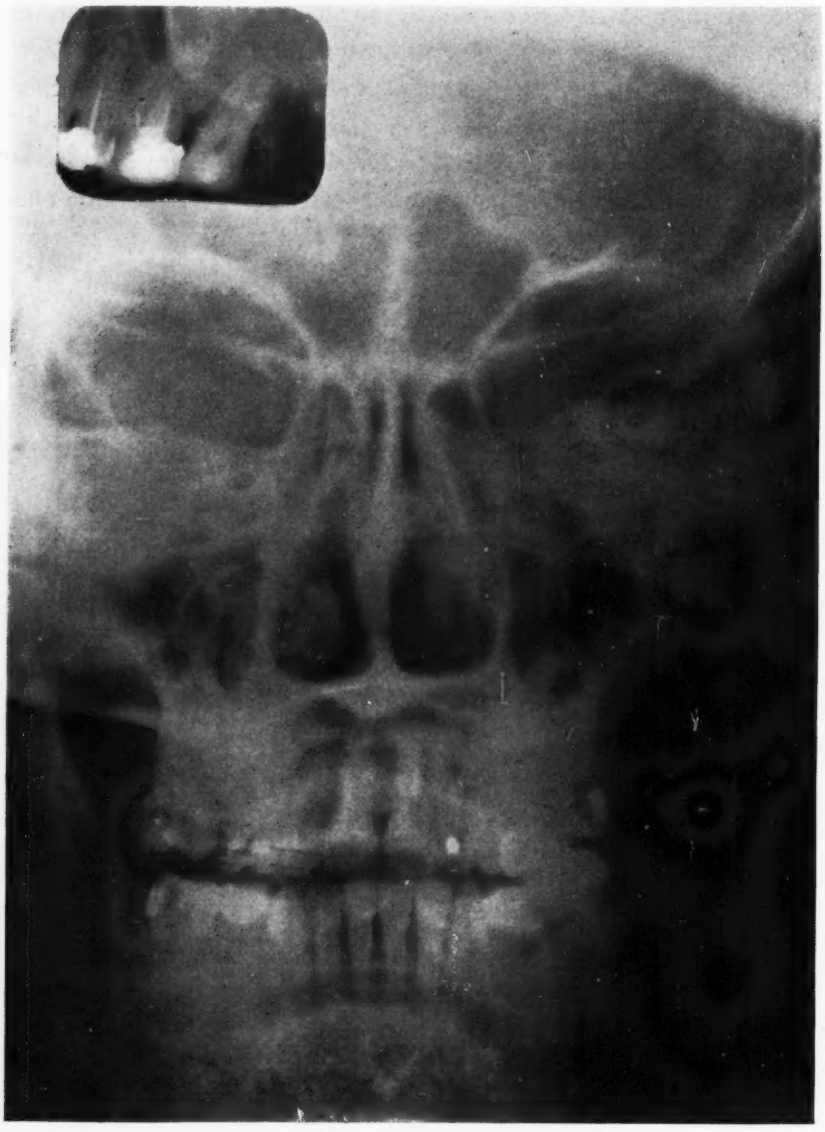


Fig. 7.—Case of Mrs. Q. Intraoral roentgenogram shows periapical osteitis of the right maxillary second premolar. The first molar shows periodontal osteitis and is pulpless. There were no symptoms of pain, swelling, or soreness. The sinus was clear under transillumination, and there were no symptoms of disturbance. In removing these two teeth the tip of the lingual root of the molar broke off. In removing this root tip, a small opening was made into the maxillary sinus, and out of this opening pus flowed. The opening was then enlarged and the sinus was found filled with pus and chronic hyperplastic tissue. This was the only way the sinus disease was detected in this case. Otherwise the patient would have returned possibly in a day or so with an acute sinus and felt that the removal of the teeth caused the sinus condition.

OCCURRENCE

While primary chronic osteomyelitis may be found in various positions in both the maxilla and mandible, this paper is devoted to those cases of this

disease involving the maxilla with particular reference to the floor of the maxillary sinus. In the maxilla the infection may gain entrance through the nasal mucosa and maxillary sinus; or in other words, the infection may invade the alveolar process and the portions of the maxilla immediately under the floor of the sinus by an extension of any chronic infection from the maxillary sinus. Chronic infections and chronic osteomyelitis of the walls of the maxillary sinus are not uncommon. These conditions are often very difficult to diagnose.

Chronic disease in the maxilla or in the maxillary sinus may be due to extension of periapical, periodontal or pericoronal diseases about the teeth, or through residual infections remaining after the removal of teeth or they may occur directly from a thrombophlebitis.

ETIOLOGY

It must be remembered that inflammation may be caused by infection, chemical irritation, traumatism, etc., and that inflammation not only may result in resorption and atrophy of the bone but may also result in hyperplasia and hypertrophy of the bone, or the affected area may show signs of alternating areas of bone destruction and bone formation.

Phemister states that there are three sources of bone infection; from the blood stream, by direct extension from soft parts and from open wounds of the bones, such as occur in fractures. A general lowered resistance frequently precedes the infection. An acute diffuse osteomyelitis begins in cancellous tissue, usually followed by vascular engorgement, edema, leucocytic infiltration with necrosis of both cancellous bone and bone marrow. It may extend through the cortex and periosteum, or it may strip up the periosteum and destroy cortical bone.

The microorganisms involved in this disease are staphylococcus, streptococcus, pneumococcus, typhoid bacillus and rarely the *Bacillus coli communis.* Osteomyelitis may occur in a healthy individual without an open wound, as organisms may enter the blood stream through the tonsils, ears, sinuses, teeth, respiratory tract, intestinal tract, or genitourinary system. In some cases trauma precedes the outbreak of the symptoms. Bacteria may enter through a wound, as in a compound fracture, or the infection may extend from neighboring tissue or through the blood stream as in infectious fevers, especially measles and scarlet fever.

The most common organism to be found in bone marrow diseases is the *Staphylococcus pyogenes aureus.* A staphylococcal infection in bone usually presents a serious picture. There is a known predisposition of bone during the period of growth, during the time it is in a state of physiologic activity to show a susceptibility to hematogenous staphylococcal infections leading to osteomyelitis. The inception of the disease is dependent upon the virulence of the invader and the resistance of the host as well as upon the quantity of growing bacteria in the body fluids. Staphylococci have been cultured from the blood stream in cases of osteomyelitis. Osteomyelitic diseases have also been produced by experimental inoculation with staphylococci. The *Staphylo-*

coccus pyogenes aureus possess decidedly a certain propensity for the formation of central bone abscesses, necrosis and sequestrum formation.

The *Staphylococcus albus* is considered next in importance. Clinically there is very little difference in the severity and course of the conditions caused by the two types of staphylococci. The *Staphylococcus albus* is present

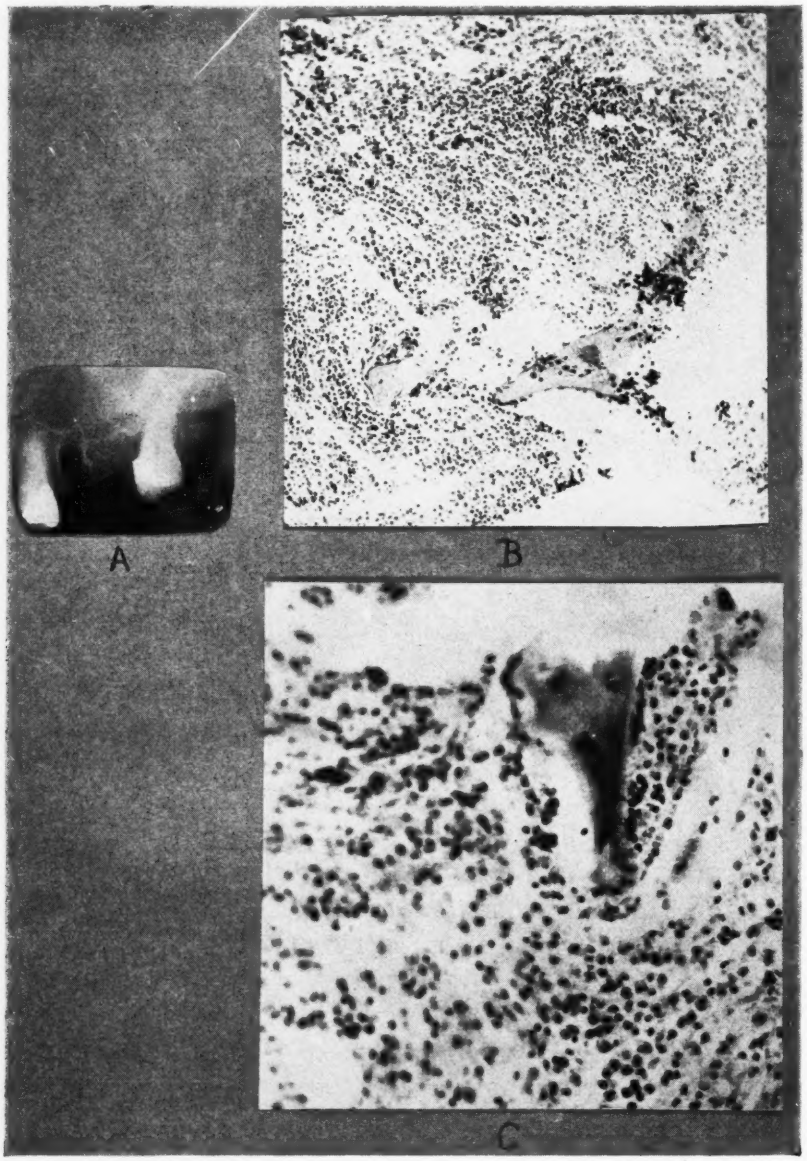


Fig. 8.-*A*, Lateral intraoral roentgenogram. Right maxillary second premolar area shows a rarefied area bordering the floor of the maxillary sinus. An exploratory incision was made and definite evidence of infection found with chronic osteomyelitis involving the floor of the sinus and opening into the sinus. *B*, Photomicrograph (x120) of area shown in *A*, showing chronic inflammatory type of the tissue. *C*, Photomicrograph (x320) of area shown in *A*, showing chronic inflammatory type of the tissue.

in a fewer number of cases than the *Staphylococcus pyogenes aureus*. The streptococcus is considered the next dangerous invader. The suppurative process when due to streptococcus infection extends more quickly and widely, but the bone as a rule is affected far less than in the staphylococcus infection.

When sequestra are formed, only the cortical layer of the bone is usually affected. The pus is different from that found in the staphylococcic infection in that it is thinner and of a bright green color. The streptococci appear to have more of a propensity of attaching the joints than the bone. An infection caused by pneumococci behaves very similarly to one caused by the streptococcus. This type of infection runs a more favorable course, the bone destruction extending less. Osteomyelitis caused exclusively by the pneumococcus is often disputed. It is generally accepted, however, that the typhoid bacillus can be the single factor in the development of suppurative bone disease appearing as a consequence of typhoid. The specificity of influenza in some cases of osteomyelitis is very often doubted, but some cases are seen which appear to have been caused by this condition. No special symptoms are noticed in this type of osteomyelitis. Mixed infections from general dis-

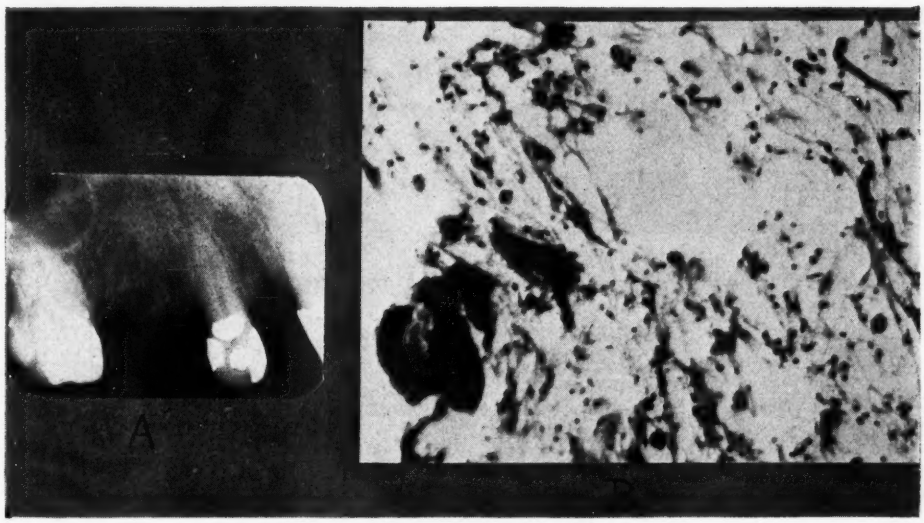


Fig. 9.—Case of Mrs. C. *A*, Lateral intraoral roentgenogram of left maxillray first molar region showing sclerotic area surrounded by a zone of rarefaction bordering the maxillary sinus. Upon exploration, the sclerotic area proved to be the apex of the root and surrounded by a zone of osteomyelitis extending into the sinus. *B*, Photomicrograph (x270) of diseased bone tissue showing typical chronic inflammatory reaction. Sections from this tissue showed a thickening and distortion of the lamellae in certain areas with rarefaction and necrotic and necrobiotic changes in others. In the latter areas many of the lacunae are quite large, vacuolated and contain dead bone cells, the outlines of the canaliculi having disappeared. The contained cancellous marrow spaces in many areas exhibit a typical plastic process with areas of patchy round cell infiltration, endothelial proliferation of many of the smaller blood vessels to the extent of complete endarteritis and endophlebitis obliterans. This is accompanied by considerable and somewhat irregular fibrotic changes with a mild degree of eosinophilic infiltration. No evidence of any tuberculous or luetic changes is present. The microscopic picture presented is that of a chronic plastic process resulting from some long-standing infection.

eases cause more osteomyelitis than specific invasions such as typhoid, paratyphoid or influenza. Here teeth with diseased roots with symptomless periapical infected areas play a large rôle. An old root area can also primarily develop into an osteomyelitis which runs a most severe course, for a mixed infection of staphylococci and streptococci may cause rapidly progressing necrosis with very severe clinical symptoms.

Osteomyelitis of the mandible and maxilla may be hematogenous in origin or it may be caused by an infection originating from the teeth or their sur-

rounding tissues. The hematogenous type may develop without any previous acute infectious disease, or it may develop a few weeks after such an acute infection.

The hematogenous type occurs most frequently in children. The acute infectious diseases occasionally followed by osteomyelitis of the jaws are scarlet fever, measles, chickenpox, influenza, typhoid fever and diphtheria.

The majority of all cases of acute osteomyelitis of the mandible and maxilla are caused by an extension of the infection from a carious tooth, from a gangrenous pulp of an apparently sound tooth, from an alveolus after an extraction, from a chronic residual infection or root or from a wound reaching the bone or periosteum, as is most commonly seen in fractures of the mandible.

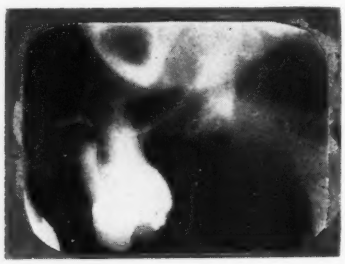


Fig. 10.

Fig. 11.

Fig. 12.

Fig. 10.—Lateral intraoral roentgenogram showing sclerotic area in region of right maxillary third molar bordering the floor of the sinus. This was found to be a chronic osteomyelitis extending into the maxillary sinus.

Fig. 11.—Lateral intraoral roentgenogram of left maxillary third molar area showing sclerotic area which proved to be two roots surrounded by chronic osteomyelitis extending into the maxillary sinus.

Fig. 12.—Lateral intraoral roentgenogram of right maxillary first premolar area showing rarefied condition which proved to be a chronic osteomyelitis, extending somewhat beyond the region shown in the roentgenogram but not involving the maxillary sinus.

Cases of acute osteomyelitis following traumatic injuries, extractions or other surgical procedures are more common in the mandible than the maxilla. The mandibular canal and its contents no doubt play a great rôle in this regard. Cases are seen where there is a very rapid spread of a localized area of osteomyelitis along the canal and often over the entire half of the mandible and ascending ramus and occasionally extending to the opposite side.

On the other hand, while acute osteomyelitis is extremely rare in the maxilla owing to the less compact nature of the bone and less opportunity for infection under pressure without an exit, there are more cases of the primary type of chronic osteomyelitis occurring in the maxilla than in the mandible. This is no doubt due to the especially favorable environment for its progress in the region of the floor of the maxillary sinus. In this region it is often very difficult to diagnose the presence of the disease, and it is often very difficult to perfect a cure because of the necessity of cooperation between the rhinologist and the dentist.

Primary chronic osteomyelitis is caused by the presence of portions of broken off roots, impacted and unerupted teeth, foreign bodies, and other sources of infection remaining in the bone after the removal of the primary cause of the infection.

Clinical observation of this type of chronic osteomyelitis leads one to conclude that it is entirely of an infective process resulting from residual infection, roots, infection by extension as from the maxillary sinus, etc. I believe that this condition exists around all roots of teeth fractured off and left in the bone if they remain long enough.

In any type of osteomyelitis there is good reason to believe that not only is it a question of virulence of the particular type of organism, but the general physical condition of the patient plays a great part. This is particularly observable in this primary chronic type of osteomyelitis, where there is a great tendency to residual destructive processes after the removal of the area of infection and where there is a great tendency to recurrence or reestablishment of the disease after surgical operative interference. It has been shown in the series of cases here reported that by removing areas of infection and surgically operating these areas there is a certain percentage of cases returning with the same symptoms, where attention is not given to the general physical condition of the patient and the question of diet in order to build them up to a place where they are able to replace lost bone tissue.

SYMPTOMS

The process of primary chronic osteomyelitis is an insidious one and the symptoms are often very vague and indefinite. In fact, the symptoms may be so slight and so ill defined that the patient is not aware that there is any disease present.

The disease usually occurs without the patient's knowledge and is a chronic inflammatory process of long standing.

The objective symptoms are occasionally a bulging or swelling of the buccal or lingual plate, or in some rare cases escaping of pus or purulent matter from a small fistula in the mouth.

The subjective symptoms are usually the diagnostic factors in bringing to the operator's attention the presence of this type of disease. The patient may complain of an indefinite or ill-defined pain radiating back of the ear, above the eye, or below the eye, or may complain of a dull, heavy, uneasy sensation of the particular region involved. There is often a sensation of fullness in the region of the maxillary sinus, and this is occasionally accom-

A.

B.

C.

D.

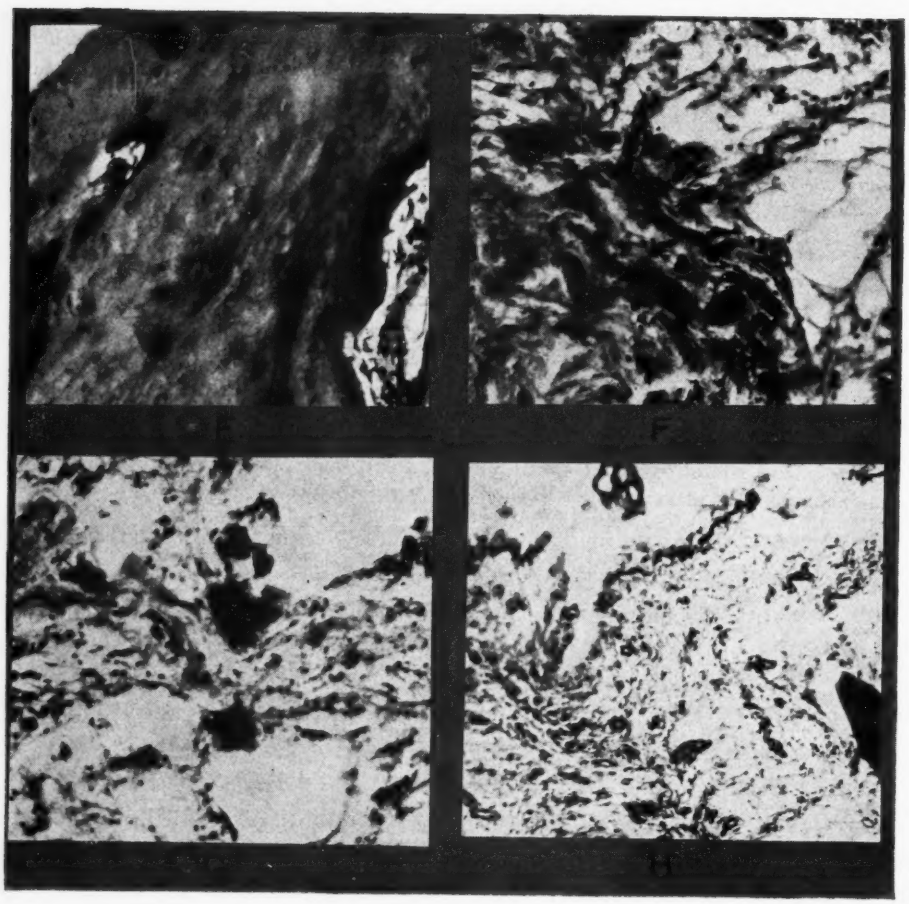


Fig. 13.

panied by a more severe type of pain. The eye may become more or less involved, so far as vision is concerned, as well as slight irritation and pain.

DIAGNOSIS

In many cases primary chronic osteomyelitis may be diagnosed from the appearance of the roentgenogram. The diseased condition may give the appearance in the roentgenogram of rarefaction or that of condensation or as an area of alternating rarefaction and condensation. There are, however, many cases of primary chronic osteomyelitis that are not shown in the roentgenogram. Many authors feel that it is impossible to have a bone disease that is not shown in the roentgenogram. This is not borne out, however, by clinical experience. This is particularly true of these areas surrounding roots remaining in the bone. The roentgenogram often shows bone of normal character, but upon opening into the area definite signs of infections are found, such as softening of the organic content, definite pathologic growths, microscopic evidence of pathology, recovery of organisms, and the relief patients obtain by the removal of these particular areas of infection.

Any one familiar with the advantages and the limitations of the roentgenogram will realize that all rarefied areas are not infected areas and will also realize that all areas of condensation or sclerosis are not infected areas. In order to interpret properly the findings of the roentgenograms, clear and distinct films are necessary, and often many additional views, and they should be interpreted by one skilled in the recognition of all the principles involved.

It is true as pointed out by Pollia and others that where there is good roentgenographic technic and proper training in diagnosis, most bone disturbances can be detected, but my experience is that not all bone diseases can be diagnosed in this manner. I have had occasion to go into a great many areas based upon other clinical diagnostic agencies, including symptom diagnosis, and I found in these cases definite evidence of disease where the roentgen-ray picture did not show any pathologic change. I am absolutely convinced of the fact that the roentgenogram is a most valuable diagnostic agency when used as one of the steps of a diagnostic procedure, but it cannot be used to the exclusion of all others.

While it is necessary to roentgenograph all of the bone structures surrounding the teeth and floor of the sinus intraorally, it is equally important to have lateral and anteroposterior roentgenograms of the sinus to aid in

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Fig. 13.—Case of Mrs. C. Chronic osteomyelitis. *A* to *H*, chronic osteitis and osteomyelitis. Sections from this tissue show a thickening and distortion of the lamellae in certain areas with rarefaction and necrotic and necrobiotic changes in others. In the latter areas many of the lacunae are quite large and contain dead bone cells, the outlines of the canaliculi having disappeared. The contained cancellous marrow spaces in many areas exhibit a typical plastic process with areas of patchy round cell infiltration, endothelial proliferation of many of the smaller blood vessels to the extent of complete endarteritis and endophlebitis obliterans. This is accompanied by considerable and somewhat irregular fibrotic changes with a mild degree of eosinophilic infiltration. No evidence of any tuberculous luetic changes is present. The microscopic picture presented is that of a chronic plastic process resulting from some long-standing infection.

A, *B*, *C*, and *D*, intraoral radiograms showing areas of chronic osteomyelitis. *E*, Photomicrograph of area of chronic osteomyelitis shown in intraoral radiograms *A*, *B*, *C*, and *D* (x265). *F* and *G*, Photomicrograph of area of chronic osteomyelitis shown in intraoral radiograms *A*, *B*, *C*, *D*. (x265). *H*, Photomicrograph of area of osteomyelitis shown in intraoral radiograms *A*, *B*, *C*, and *D*. (x179).

determining whether or not there is disease present in the sinus. In addition to these usual types of roentgenograms, it is occasionally necessary to make anteroposterior and lateral extraoral roentgenograms after injecting the sinus with a lipiodol solution and closing the opening into the sinus to prevent the escape of the lipiodol. This is particularly useful in diagnosing cysts and hyperplastic conditions of the sinus.

While in the treatment of the disease involving the maxillary sinus and the maxilla, it is of great importance to have the complete cooperation of the rhinologist and the oral surgeon, still it is of equal importance to have the complete cooperation of these two specialists in the diagnosis of a disease of this type. It is necessary to take into consideration a great many diagnostic factors in recognizing diseased sinuses, such as irrigation, roentgenogram, transillumination, symptoms, etc.

I believe there are a great many pathologic areas in and about the maxillary sinus that are not diagnosed by either the rhinologist or the dental surgeon. There are a great many of the so-called borderline cases where the disease is not discovered by the dentist in his usual routine examination of the roentgenogram, transillumination, etc., and the rhinologist may fail to discover the disease of the sinus through his usual method of irrigation, roentgenogram, transillumination, etc. In many of these cases where an exploratory incision is made upon the findings of symptom diagnosis, in order to make a final diagnosis, definite evidence of pathologic conditions are found that would otherwise be overlooked. In many of these cases the area of infection lies just below the field of the rhinologist and above that of the dentist. In other words, the dental surgeon in his examination falls short of breaking into the maxillary sinus and the rhinologist stops in his treatment just short of cleaning out the lining membrane of the floor of the sinus down to the area of bone below.

Transillumination is often helpful in locating areas of chronic osteomyelitis, as in some cases there is an involvement of the overlying soft tissue which will show up under this method. Fistulas occasionally occur and can often be detected by transillumination.

Because of the vague nature of the symptoms of primary chronic osteomyelitis, it is often necessary to diagnose the disease from the symptoms suggested by the patient. In other words, these symptoms given by the patient may suggest the possibility of the presence of this particular type of disease when considered in connection with other cases occurring during the operator's clinical experience with like symptoms.

When these diseased areas are suspected from the evidence of symptoms, even though all the other diagnostic factors are negative, an exploratory operation is usually necesary to confirm the diagnosis.

These symptoms are usually a vague and indefinite pain, feeling of dullness over the site of the face affected, disturbance of the eye, referred pains over the eye, under the eye and back of the ear, etc. It has been my experience that this condition is found around almost all roots that have been left in the tissue and the bone regardless of the roentgenogram picture. Upon opening into these areas the condition is often found to be much worse than

shown in the roentgenogram. The bone tissue may be very soft and spongy and easily removed with a curette. The area has a honey-combed appearance and consists of a bony framework without any bone consistency.

Sections taken from this type of chronic osteomyelitis will show considerable thickening of the cancellated canaliculi with a narrowing of the Haversian canals and bordering lacuni accompanied by a very marked fibrosis of the tissue of the cancellated marrow spaces. In certain areas throughout the marrow spaces of the bone there is evidence of a low grade chronic inflammation characterized by patchy round small infiltrations and endothelial proliferations of the preformed blood vessels. In some sections there is a thickening and distortion of the lamella with rarefaction and there are necrobiotic changes in others. There is evidence of endothelial proliferations of many of the smaller blood vessels to the extent of complete endarteritis and endophlebitis obliterans.

(To be continued in November issue.)

MISPLACED AND DEEPLY EMBEDDED MANDIBULAR THIRD MOLARS NECESSITATING EXTRAORAL REMOVAL*

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I DESIRE to present a study of the removal of the mandibular third molar. A morphologic and pathologic study of the mandibular third molar, as well as a careful review of the literature of this interesting subject, shows clearly the wide difference and confusion of opinion there is on all phases of the subject: (1) diagnosis, (2) pathologic changes, (3) prognosis, and (4) treatment.

There has been much speculation in the field, too much speculation for the amount of real scientific surgical knowledge and procedure. The usual and common opinion that most malpositions and perversions are impactions, and therefore injurious or detrimental to the health of the patient, has led to many unwarranted removals of the mandibular third molar. These unnecessary and unwarranted operations have given rise to complications that have resulted in needless suffering, postoperative infections, and, sometimes, have ended fatally.

Our problem today is, therefore, to consider this problem of the indications and contraindications for the removal of the mandibular third molar in the light of some recent experience in order to correct some misconceptions, clarify the terminology and indicate new or more effective operative procedures where these are necessary. Against this background we shall consider more particularly the case of the misplaced and deeply embedded mandibular third moral which necessitates extraoral removal.

PATHOLOGIC CONDITIONS OF THE MANDIBULAR THIRD MOLAR

A mandible that is not sufficiently elongated backward to permit the third molar to occupy its position in the horizontal series with the other teeth, perverts the normal course of eruption. Therefore this tooth may remain imbedded within the jaw during the life of the patient. It may undergo partial eruption and lie in a position where the mucous membrane is reflected from the gum to the cheeks and fauces.

The operculum of the gum which covers part of the crown will allow decomposition of the epithelial scales and débris of the mouth combined with the acidity engendered by their disintegration to corrode the structure of the tooth. This destruction and degeneration of the tooth substance will eventually involve the pulp, resulting in violent pulpitis and subsequent infection of the deeper structures, or it may start an infection at the gingival area to extend into the pericemental membrane to develop an osteopericementitis.

*Presented at the Thirtieth Annual Meeting of the American Society of Orthodontists, St. Louis, Mo., April 20-24, 1931.

If this pathologic condition is permitted to develop, the process of infection may extend into the bony structure with little or no pain for a long period. Eventually an acute exacerbation will develop symptoms that are alarming. These are: excruciating pain of a stabbing throbbing nature, a rise in temperature, an increase in leucocytes, painful deglutition, and marked trismus.

The destructive process of this acute osteopericementitis if unchecked will continue to destroy some of the cancellous structure of the jaw (what is known as an osteomyelitis) burrowing through the bone. The swelling will then be pronounced, since the soft tissues will be invaded resulting in a perimaxillary phlegmonous cellulitis. When this happens tumefaction is complete, and the excruciating pain ceases, but the patient remains seriously ill,

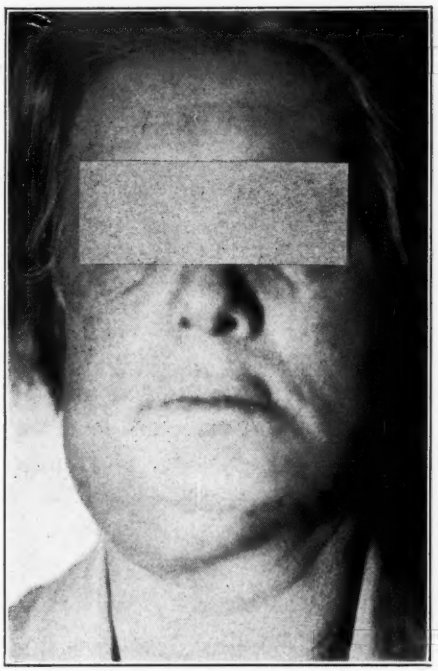

Fig. 1.—Perimaxillary phlegmonous cellulitis following the removal of mandibular third molar.

trismus is complete, deglution is painful and difficult. The condition is illustrated in Fig. 1.

The above pathologic phenomenon may frequently follow an operation that is performed for the removal of a mandibular third molar when surgical principles are disregarded and the application of surgical science is frustrated.

The rough and unskilled methods of cutting and digging out a molar with little or no consideration of surgical principles and surgical judgment may cause the patient to suffer postoperative complications resulting in extensive necrosis and occasionally in fatality.

I recall two patients who were tortured by brutal and unskilled operations in the removal of the third molars. One patient developed a pronounced osteomyelitis with perimaxillary phlegmonous cellulitis following the removal of an infected mandibular third molar and the socket closed by suturing, thus

shutting off wound drainage, resulting in a marked trismus, a pronounced cellulitis of the floor of the mouth, ending with septic pneumonia.

The other patient developed a postoperative infection involving the cancellous structure of the mandible which was so extensive that one-half of the mandible was involved; it then resulted in a general infection with an acute endocarditis and death.

I mention these two cases merely to emphasize that surgical judgment is of fundamental and decisive importance when attempting to determine whether or not the tooth should be removed, or to treat or remove an imbedded mandibular third molar that is in need of surgical care.

MISINTERPRETATION OF RADIOGRAPHS

Another cause of unnecessary operation or recommendation for such operations is a misinterpretation of the radiograph. Too often in a radiograph an unerupted third molar is discovered that appears to be in a malposition and is diagnosed as an "impaction," when as a matter of fact, the distortion of the shadow in the radiograph is an unreality and seemingly appears as a malposition of the tooth. These cases are too frequently diagnosed as impactions and too often operated on.

I recall a young lady twenty years of age who was very much disturbed because her dentist after x-raying her teeth made a diagnosis of impacted mandibular third molar, advised the removal of these teeth and sent her to an exodontist to undergo an operation. The exodontist confirmed the findings of the family dentist and he too advised an operation. The reluctancy of the patient to submit to an operation caused her to consult the family physician for advice. The physician referred the young lady to me for further examination. The patient was in excellent health—the teeth were clean and in correct occlusion. The mandibular third molars were unerupted. A radigraph of the mandible showed that the molars in question were erupting in a jaw sufficiently elongated to permit the normal eruption of these teeth. The patient was advised to forget about undergoing an operation. Two years later she reported to me that the molars had erupted, and she was profuse in her thanks for escaping an unwarranted operation.

THE NEED FOR AN IMPROVED TERMINOLOGY

Pathologic and morphologic findings should always be told in clear and concise language. Lacking definiteness or precision, to be indistinct and obscure will confuse the student or coworkers with misapprehension. If our terminology in the medical literature was standardized and applied correctly and more time devoted to the study of pathologic and morphologic problems, then diagnosis, treatment and prognosis would be more interesting and certain. It would help us see our way through a heterogeneous and confused mass of obsolete and unscientific material published in our literature, and to discern unmistakably that material is near, and sometimes as actually quackery.

The indications for or against the removal of a mandibular third molar must be based on a scientific analysis of the pathologic findings with an exact

nomenclature. Unfortunately too many of these teeth are removed that should remain in the jaw, and too many times these molars are left in the jaw when they should be removed.

The various malpositions that the mandibular third molar may occupy should not be called "impactions." The malposition should be given a term that really designates the position of the tooth. Furthermore, if the malposition of the tooth is associated with pathologic changes of the tissue adjoining, it is important that an expression be given that designates a clear picture of the abnormal findings. The term "impaction" is misleading. It does not signify the malposition of the tooth. We have not as yet generally ac-

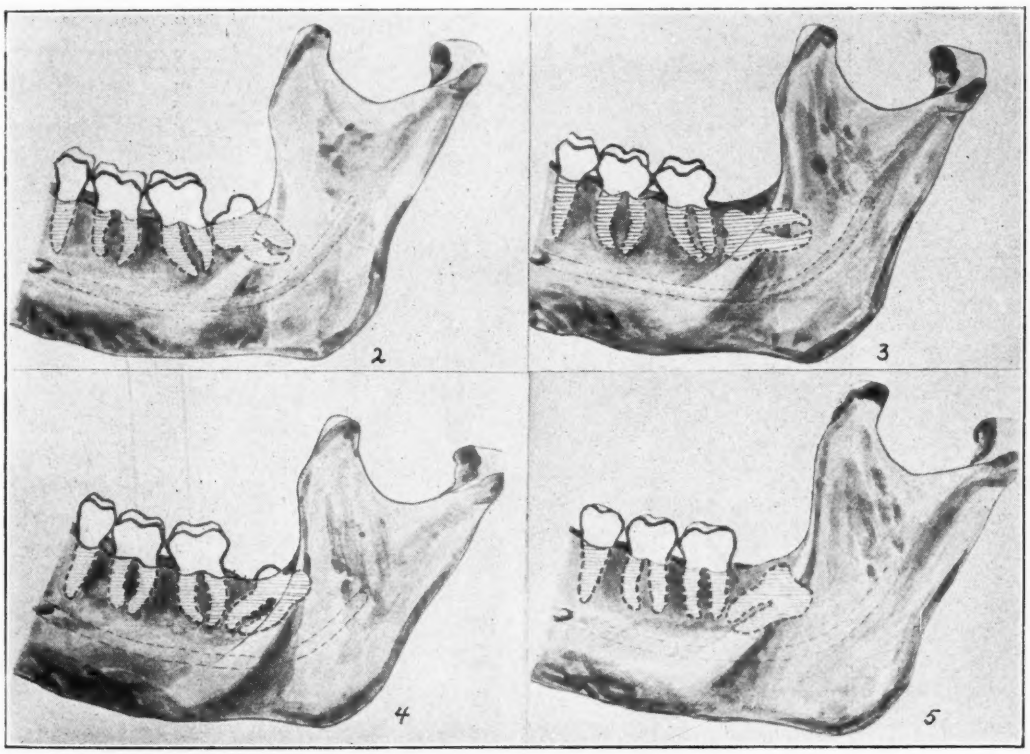

Fig. 2.—Incomplete antroperversion of mandibular third molar.
Fig. 3.—Complete antroperversion of mandibular third molar.
Fig. 4.—Incomplete retroperversion of mandibular third molar.
Fig. 5.—Complete retroperversion of mandibular third molar.

cepted terminology; if we did, our work would be greatly facilitated and scientific literature would be more helpful to the practitioner. For your consideration I wish to recommend a terminology which I believe is simple and found convenient for teaching in the Department of Oral Surgery at the Dental School of Marquette University.

The malposition of the mandibular third molar impactions, I classify as follows:

ANTROPERVERSION	—	Incomplete	—	Fig. 2
ANTROPERVERSION	—	Complete	—	Fig. 3
RETROPERVERSION	—	Incomplete	—	Fig. 4
RETROPERVERSION	—	Complete	—	Fig. 5

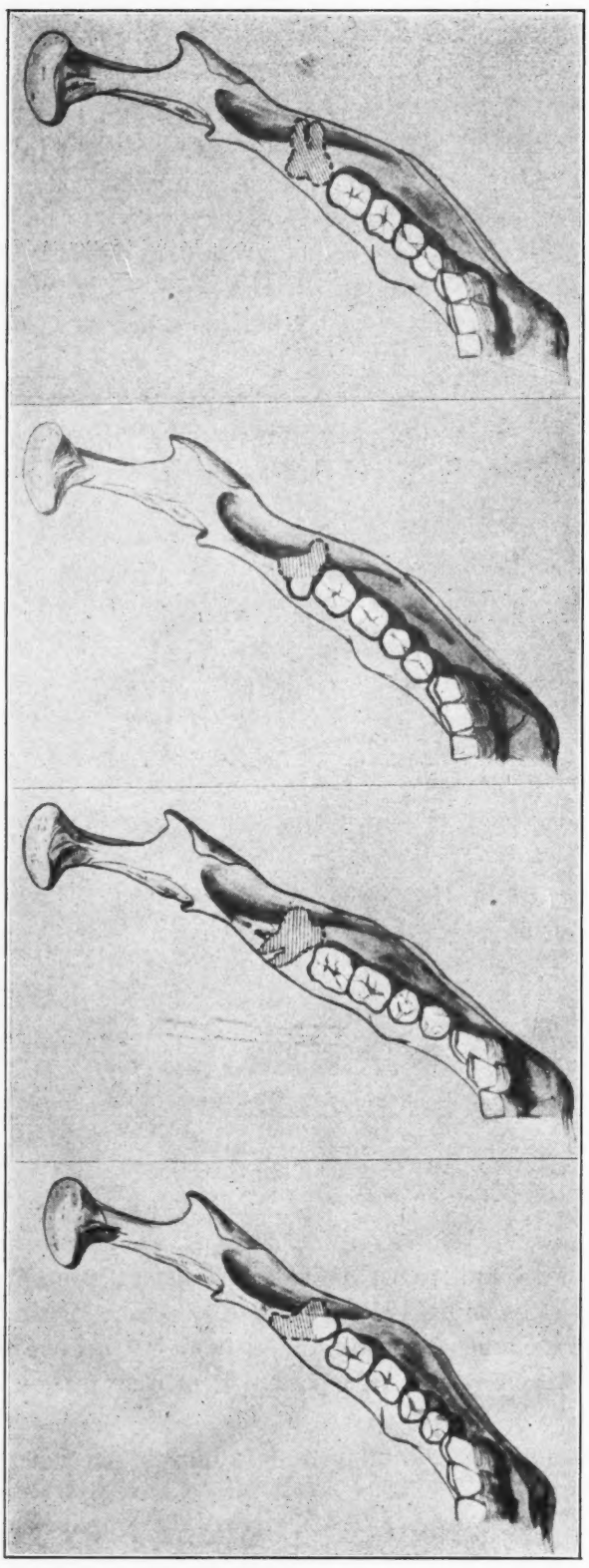

Fig. 6. Fig. 7. Fig. 8. Fig. 9.

Fig. 6.—Incomplete buccalperversion of mandibular third molar.
Fig. 7.—Complete buccalperversion of mandibular third molar.
Fig. 8.—Incomplete lingoperversion of mandibular third molar.
Fig. 9.—Complete lingoperversion of mandibular third molar.

BUCCALPERVERSION	—	Incomplete	—	Fig. 6
BUCCALPERVERSION	—	Complete	—	Fig. 7
LINGOPERVERSION	—	Incomplete	—	Fig. 8
LINGOPERVERSION	—	Complete	—	Fig. 9
INVERSION	—			Fig. 10

It is not uncommon to find a third molar in a position that may be considered lying forward and buccally; if so, then the position of the tooth should be described as in antrobuccal perversion. If forward and lingually, it is then in antrolingual perversion. So combining two names will describe the various positions depending on the location of the tooth.

A molar in any malposition here mentioned may develop complication such as gingivopericementitis, osteopericementitis, osteomyelitis, follicular cyst, etc.

If the pathologic finding would reveal a molar in complete antroperversion and that tooth is associated with an osteopericementitis, then this morbid condition should be called antroperversion complicated by osteopericementitis.

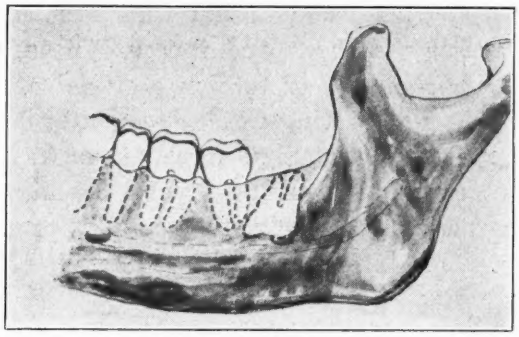

Fig. 10.—Inversion.

If the tooth was involved with a follicular cyst, then this condition should be described as third molar, antroperversion associated with a follicular cyst.

I recall a case where the left mandibular third molar had partially erupted lingually from the anatomical line of occlusion. This tooth being tilted toward the tongue had developed on the buccal side a suppuration oozing out at the coronal buccal area. Further investigation revealed an osteopericementitis.

In order to give a clear pathologic terminology to this morbid condition, it should be told in a language that is generally understandable. The following, I am sure would be helpful if used generally.

Left mandibular third molar in partial lingoperversion with buccal osteopericementitis. To call this tooth third molar impaction with pyorrhea does not describe the position of the tooth or the area involved in chronic inflammation.

Orthodontists are familiar with the end-results after the teeth have been placed in correct anatomic relation to find that shortly before and during the eruption of the mandibular third molar that the teeth in the mandible become crowded together or shift in an irregular position. When this happens, it usually occurs in a jaw that is too short to accommodate a full set of sixteen

teeth. In such cases surgical interference is a necessity. The unerupted third molar should be removed; unless this is done, there is danger that the harmonious relation of the teeth will be disturbed.

The deflection of a tooth from the normal path of eruption is easily accomplished when we give consideration to the rapid absorption of the bone on the exterior surface of the crypt creating an orifice, larger than the crown of the tooth. Even when the tooth leaves its bony crypt the socket is much too large for it. Therefore a slight force will alter the direction of the erupting tooth.

CAUSE OF DEFLECTION OF TEETH

The various forces that cause teeth to be deflected into malposition are a very interesting subject and in need of further investigation. Up to this time evidence is rather incomplete. Unfortunately in many other pathologic manifestations, medical research and investigation have not determined the causative factors. Yet it is practical and possible many times to establish a cure and correct the abnormal findings.

One should always recognize the danger of a slowly erupting third molar that is partially covered with a fibrous mat where the mucous membrane is reflected from the gum to the cheek and fauces. In such cases the patient should be told of the possibilities of foreign material accumulation beneath the tough unyielding fibrous covering which frequently develops an acute infection developing an abscess that may spread into the adjoining structure with alarming symptoms and results. Such cases require immediate surgical care. The fibrous mat should be freely cut away to permit a complete exposure of the occlusal surface of the crown. The tooth will then usually erupt rapidly.

When mechanical force in orthodontic practice is done too rapidly and the mandibular teeth are shifted backward, it then becomes necessary and important to give serious consideration to the effect on the unerupted third molar.

Many years ago when I was active in the practice of orthodontics I attempted to correct a mesioclusion which at that time we diagnosed as Class III, I was advised that in this particular case, a young girl, aged fourteen years; the mandibular teeth were too far forward, the maxillary teeth were in correct anatomical position.

It was in the days of a rigid teaching based on a false speculative, uncompromising method of diagnosis, that diagnosis relating to malocclusion of teeth must be based on the established and positive accepted principle of the new school in orthodontic teaching that the first maxillary molar is the key to occlusion. It was a doctrine asserted and adopted on authority without being distinguished from the result of scientific investigation and experience.

The mandibular teeth were shifted distally so that a correct relation of the maxillary and mandibular inclined planes was established. Shortly after that the patient developed an acute ostitis of the jaw with a pronounced swelling. The patient was at this time close to seventeen years of age. Trismus was rapid, swallowing painful and temperature rising rapidly. Fortunately the young lady was directed to an oral surgeon, who mildly and yet forcibly impressed on my mind that the orthodontic treatment I applied was

contrary to diagnosis, and he reminded me that I should have moved the maxillary teeth forward. Then he gave me further instructions on jaw formation and interstitial growth, and surely gave vent to a practice that he considered vicious and contrary to the principles of surgery and surgical judgment. The appliance was removed and an extraoral incision was made to permit free drainage. Later the third molars were removed.

At the time I was advised that if it is necessary to force the mandibular teeth backward as a preoperative measure, the third molar should be removed.

During my surgical experience of many years since this unfortunate experience I am convinced not only that the advice given me was sound, but that diagnosis in orthodontics needs a greater and more comprehensive study and investigation, than to depend on assertion that the first molar is the key to orthodontic diagnosis. It forces the student in practice that is not only provincial but limited in the field of research and investigation.

While the technic for the removal of the so-called impacted teeth that occupy various malpositions may be appropriate to this paper, I do not deem it wise, as it would entail a subject too lengthy and would largely be a repetition of what has been heretofore published in the literature—especially so in that splendid work by Dr. George B. Winter, "The Impacted Third Molar."

COMPLICATIONS FOLLOWING REMOVAL OF MANDIBULAR THIRD MOLAR

However, I do deem it necessary to consider some of the complications that may follow the removal of such teeth. Occasionally the mandible may be fractured in the attempt forcibly to remove a mandibular third molar in malposition. The removal of an imbedded molar that is not sufficiently liberated by the removal of the surrounding bone is gross negligence. The tooth or the mandible will be fractured. Such an accident may be the cause of alarming symptoms. Infection may follow the line of the fracture resulting in further complication that may end in a permanent deformity.

Sublaxation may result from a careless operation in which the ligaments and soft tissue attachments may be stretched sufficiently to permit the mandible to shift forward and laterally when the mouth is opened. The condyle will ride on the emenantia articularis and then suddenly slide back into the glenoid fossa causing a clicking sound that alarms the patient in fear of jaw dislocation.

Injuring the lingual nerve by the accidental slipping of instruments may happen. The patient will complain of numbness on one side of the tongue. Lacerating, pinching and bruising the lips is not an uncommon occurrence when operators attempt to do a hasty and quick operation. The lower lip being anesthetized, the patient is unaware of damage being done to the tissue.

The second permanent mandibular molar may be loosened or injured when operating for the removal of a mandibular third molar, especially if the second molar is used as a fulcrum against which an elevator rests to lift the third molars. In cases in which digging and gouging the adjacent osseous structure has exposed the pericemental membrane of the second molar, considerable prolonged postoperative pain results, which eventually develops a chronic pericementitis with loss of the third molar. Intraoral removal of

mandibular third molars in malposition frequently gives rise to serious postoperative pains; indeed these pains are excruciating, causing the patients to have sleepless nights. And, as I have said, postoperative infections are not uncommon, especially where operative procedures are done without hospital operating facilities.

EXTRAORAL REMOVAL OF MANDIBULAR THIRD MOLAR

During the past several years I have concluded that deeply impacted and misplaced teeth can be operated on extraorally for the removal with a greater degree of safety and very little and sometimes no postoperative pain and furthermore minimized to a very small degree of postoperative infection. In all the patients operated on extraorally the results have been most gratifying. I therefore wish to report to you a few of these interesting cases to demonstrate that such operations are more practicable and give the patient far more comfort during the healing period.

The reasons for the extraoral removal of the mandibular third molar may be successively stated as follows:

1. It is done more rapidly.
2. There is very little postoperative pain.
3. Healing is hastened.
4. There is no postoperative trismus.
5. Postoperative infection is nil.
6. Deglutition is without pain.
7. There should be no visible scar.
8. The field of operation is more visible.
9. Hemorrhage is easily controlled.
10. Drainage when necessary is better.

CASE 1.—History, L. K., a man, aged thirty-one years, complained of pain in the region of the mandibular third molar on the left side complicated by trismus of the jaw. About four years previously, his dentist had extracted the left mandibular second molar which he believed had been causing the pain. After the removal of this molar, the pain subsided; but several months later the patient again experienced pain, which came on periodically in the angle of the mandible, radiating upward into the temporal region. During the last few months, he had noticed a swelling of the soft structure beneath the jaw bone, and experienced considerable difficulty in opening his mouth. The jaw felt stiff. The patient appeared to be well nourished, his general condition was good and he was able to continue his work as a carpenter without loss of time from ill health. The local pain in his jaw, accompanied by trismus, was annoying to the extent of causing him anxiety and worry. He feared that he might develop lockjaw (Fig. 11).

Examination.—His teeth appeared to be clean, and there was no evidence of gingival irritation. There was considerable trismus. He could open his jaw to the extent that a mouth mirror could be inserted, but this caused him much pain. The occlusion of his teeth was anatomically correct, and the only

missing teeth were the mandibular left second and third molars. The tonsils and mucous membrane of the pharynx and oral cavity appeared to be healthy. The left submaxillary gland was enlarged. The white blood count was 12,500; the temperature, 99.06. A roentgenogram of the left mandible revealed a displaced third molar lying at the lower border of the mandible. The area surrounding the tooth above the crown showed evidence of undergoing degen-

Fig. 11.—Jaw trismus with slight swelling of left submaxillary region caused by a misplaced and deeply embedded mandibular third molar with an infected cyst.

Fig. 12.—Displaced third molar with an infected follicular cyst.

erative changes, probably caused by pressure of a follicular cyst, which so frequently is associated with misplaced and embedded teeth (Fig. 12).

Preoperative Diagnosis.—Perversion of the left mandibular third molar complicated by an infected follicular cyst was diagnosed.

Operation.—The patient was advised that surgical care would be necessary to obtain a cure. He readily consented to this, and was referred to the Marquette University Hospital, to be operated on the next day. Under general anesthesia (ether) an incision 2 inches long was made beneath the mandible. The soft tissues were separated and retracted in order to expose the

outer wall of the mandible. The bone covering the imprisoned tooth was cut away with a surgical bur. (Fig. 13.) An opening was made large enough to remove the tooth.

The cutting of the bone with a surgical bur is extremely gratifying to the operator who wishes to do accurate and quick work. Its use is more advantageous than the use of the bone chisels, especially if one is well provided with an assortment of well-tempered sharp burs. If the burs are dull, the cutting process is not accomplished with ease, and may produce enough friction to cause a bone burn. If this happens, the healing process is retarded, there is much pain and postoperative infection may develop.

A gear driven Dumore surgical engine with the usual S. S. White hand piece was used. The cable was washed with 25 per cent solution of lysol

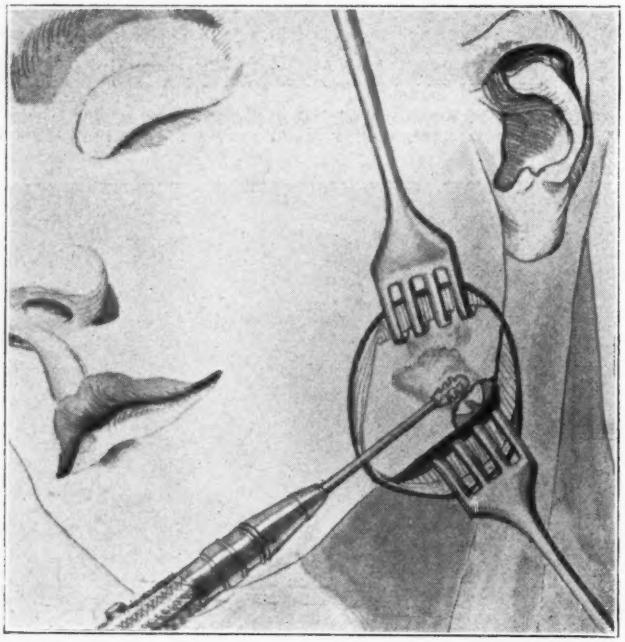

Fig. 13.—Retraction of soft tissues to expose the bone; removal of the bone covering the tooth.

(compound solution of cresol) and covered with a sterile muslin sleeve. The hand piece was boiled and lubricated with sterile oil. The burs were sterilized in a 96 per cent solution of phenol and then washed in sterile water.

The cutting away of the bone to release the imprisoned tooth took but a few minutes. After the tooth was removed, the cavity was found to be infected and partly lined with remnants of a follicular cyst membrane.

The cavity was thoroughly curetted and cleansed, then swabbed with glycerozinc iodine and lightly packed with 5 per cent iodoform gauze. The wound was closed with dermal suture, the gauze protruding to allow drainage (Fig. 14).

After-Care.—Twenty-four hours after the operation the gauze was removed, and narrow strips of 5 per cent iodoform gauze were replaced in the wound to permit further drainage. The next day the gauze was removed, and the wound was gently irrigated with a 50 per cent solution of hexylresor-

cinol and dressed with a dry gauze bandage. The sixth day, the sutures were removed. The patient was able to open his mouth quite freely (Fig. 15).

CASE 2.—History, M. S., a man, aged forty-three years, a painter, weighing 190 pounds, complained of excruciating head pains and jaw trismus with a swelling in the region of the posterior angle of the left mandible.

Fig. 14.—Wound closed permitting gauze to protrude.

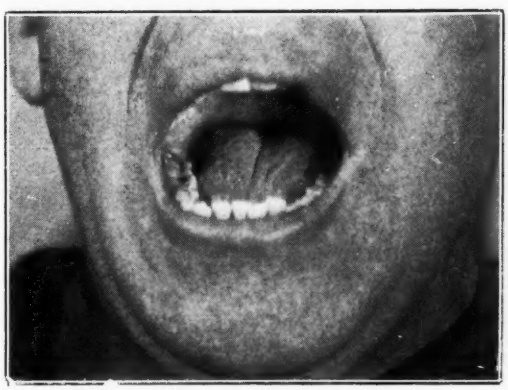

Fig. 15.—Ability to open mouth two weeks after operation. This could be done without strain or tension.

Examination.—The temperature was 99.06°, the urine negative except for a slight trace of albumin. Because of the pronounced trismus, close inspection of the mouth was difficult. The following teeth were missing: maxillary left first and second molars, maxillary right first premolar, and first and third molars; mandibular left first premolar and first, second and third molars; mandibular right, first, second and third molars. The roots of the maxil-

lary left lateral incisor and third molar were diseased and decayed. The remaining teeth were stained and the gingiva was undergoing chronic inflammation. The swelling was about the size of a hen's egg. On palpation, the mass was found to be hard, firm and slightly painful. A roentgenogram of the swollen area revealed an unerupted molar deeply buried within the structure of the mandible (Fig. 16).

Diagnosis.—Unerupted third molar accompanied by an infected follicular cyst and complicated with osteitis which had developed into a subperiosteal abscess was diagnosed.

Operation.—An incision 2.5 inches long was made beneath the border of the mandible. Considerable pus was liberated from the opening. The soft

Fig. 16.—Unerupted third molar with an infected cyst.

tissues were peeled away from the bone, the area being sufficiently exposed to permit the cutting of a window in order to remove the imprisoned tooth. This operation was done at the hospital under nitrous oxid-oxygen anesthesia.

A surgical bur was used to cut away the bone in order to expose the embedded tooth, which was found to be surrounded by a cyst wall partially broken down and filled with a thick, purulent, yellowish gray pus. The tooth socket and the surrounding infected area were thoroughly cleansed and irrigated. The cavity was gently packed with iodoform gauze, which was permitted to protrude externally in order to provide drainage. The greater part of the wound was closed and kept so with silk ligature.

Results.—This case required twenty days of postoperative care. At the end of this time, drainage had ceased, and the wound was apparently healed.

The patient was discharged as cured and instructed to return in four weeks for further observation. When he returned the tissues had assumed their natural form; the swelling had disappeared, and he was again able to open his mouth freely and easily.

CASE 3.—F. J., a man, aged twenty-seven years, was referred by his dentist, who had discovered that the right mandible was thickened. The patient had not suffered any pain, and the general health was good. A roentgenogram of the jaw revealed a large cyst with an unerupted third molar. (Fig. 17.)

Diagnosis.—A large follicular cyst with an unerupted third molar was the tentative diagnosis. Operation was advised and the patient was referred to the hospital.

Fig. 17.—Large follicular cyst with a displaced third molar.

Operation.—The next day, under general anesthesia (ether) an incision was made beneath the mandible of the jaw, and the soft tissue stripped from the bone. The external plate of the jaw was found to be very thin and could be easily removed. A large cyst was found, containing a semitransparent fluid, which was evacuated. The third molar could be seen within the sack (Fig. 18). The bone cavity was enlarged, and the cyst wall and tooth were removed (Fig. 19). The cavity was lightly packed with iodoform gauze, and the soft tissues were brought together and held so with silk ligature.

Results.—After forty-eight hours, the gauze packing was removed. The wound was dressed daily, and after two weeks the patient was dismissed as cured.

CASE 4.—Male, aged twenty years, complained of a deep localized pain in the left side of the mandible in the region of the third molar. A radiogram

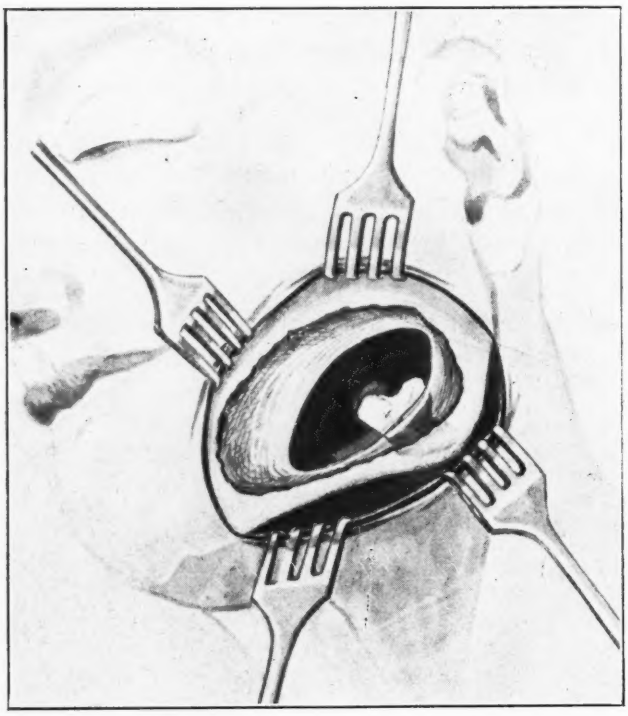

Fig. 18.—Large cyst and third molar within bone structure.

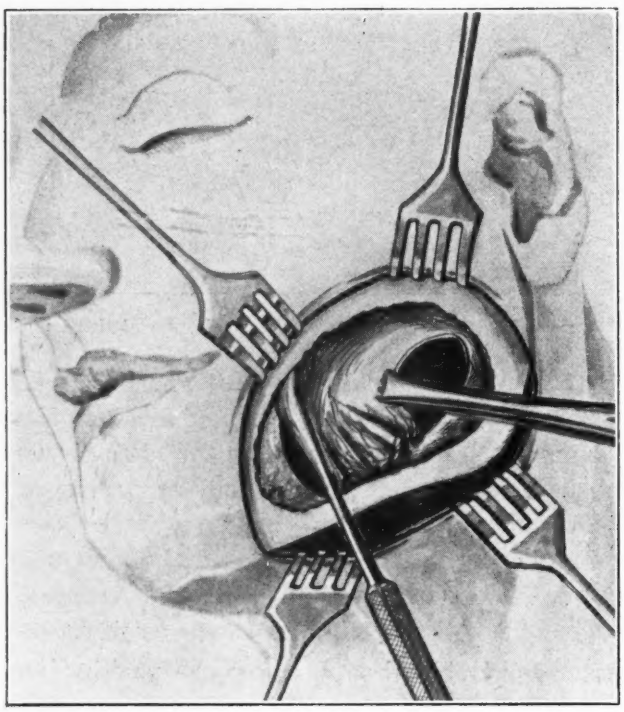

Fig. 19.—Removal of cyst after evacuating fluid and removal of tooth.

of this area revealed a third molar deeply buried within the body of the mandible. (Fig. 20.)

The tooth was removed extraorally. This was done by making an incision 2.5 inches long through the soft tissue beneath the mandible down to the bone and then stripped upward to expose the buccal side of the jaw sufficiently to permit cutting out a window over the imprisoned tooth. The cavity containing the tooth was found to be rather extensive and filled with a foul smelling, thick, purulent secretion, lined with remnants of a follicular membrane that was undergoing degenerative changes.

The cavity was cleansed, the tooth removed and the wall scraped clean. Then irrigated with 1:500 solution of metaphen and lightly packed with ½ inch tape of 5 per cent iodoform gauze.

Fig. 20.—Third molar deeply buried within the body of the mandible.

The wound was closed leaving the end of the gauze to protrude. Each day during the week a portion of the gauze was removed and cut off and the wound dressed. After ten days following the operation the patient was dismissed as cured.

At no time did the patient suffer any discomfort. There was no postoperative pain or trismus.

Case 5.—Male, aged forty-five years, suffering with a compound fracture. The radiograph revealed that the jaw bone was fractured in the region of the third molar with the tooth lying in complete buccal antroperversion. (Fig. 21.)

Before immobilizing the bone the tooth was removed extraorally and a strip of gauze lightly packed in the wound to permit drainage. The bone was immobilized the next day by intraoral wiring. The patient made a rapid recovery without the development of postoperative complications.

CASE 6.—Female, aged twenty-five years, suffering with periodic swelling of the right mandibular region, with discharge of pus from the alveolar structure at about the third molar region. The radiogram shows an unerupted third molar surrounded with a suppurative osteitis. In front of this diseased area there was a large cystic area. (Fig. 22.)

Fig. 21.—Complete buccal antroperversion of third molar with a fracture of the mandible.

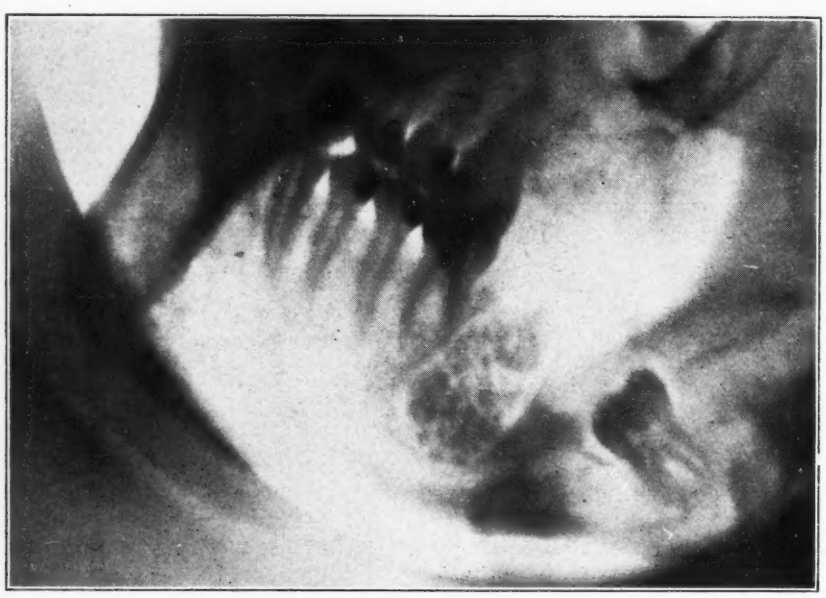

Fig. 22.—Deeply embedded third molar with suppurative osteitis and a large cyst which contained thirty-seven small supernumerary toothlike structures.

The patient was operated on intraorally. The soft tissues were stripped from the buccal plate. The third molar and a rather large sequestrum was removed. The outer bone covering the cyst was cut away, and the cyst containing thirty-seven very small supernumerary toothlike structures was removed.

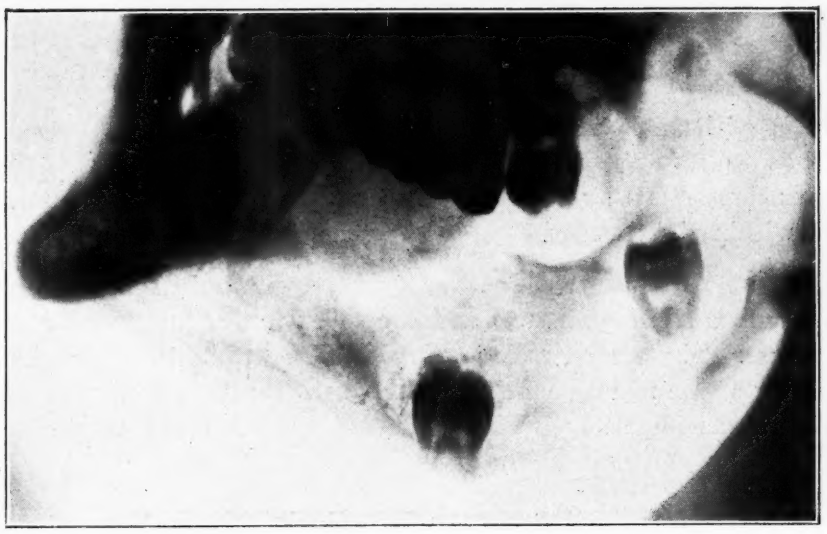

Fig. 23.

Fig. 24.

Fig. 25.

Fig. 23.—Displaced second molar with a large follicular cyst and an unerupted and deeply embedded third molar.

Fig. 24.—Third molar within the osseous structure of the ascending right ramus.

Fig. 25.—Ilustrating condition of jaw nine and one-half months after removing molar from the ascending ramus.

The section of bone between the cyst cavity and the diseased area was cut away so as to form a large depression. Frequent irrigation of this deep cavity was done daily by the patient. The recovery was rapid and healing complete within eight weeks.

CASE 7.—Male, aged twenty-seven years, suffering from a swelling of the mandible with a slight pain. The radiograph showed this to be a rather interesting case. The second molar was displaced within the bone close to the lower border of the mandible and associated with a large follicular cyst. The third molar was imprisoned within the osseous structure of the ascending ramus. (Fig. 23.)

Fig. 26.—Illustrating a very slight scar at the posterior angle of the mandible, nine and one-half months after operation.

The patient will undergo surgical care. In this case the operation will be performed extraorally in order to permit visualizing the field for a complete removal of the cystic wall and the second and third molar; and to dress the wound without contamination with the assurance that there should be no postoperative complications.

CASE 8.—Female, aged twenty-three years, suffering from rheumatism. Her teeth were x-rayed by her dentist to determine if she had any infected teeth. The radiograph shows a third molar lying rather high within the osseous structure of the ascending right ramus. (Fig. 24.)

The patient was informed that the removal of the molar would not offer relief to her physical condition; however, she was determined to have it out because of its peculiar location and that it might give a possible relief from

rheumatism pains. The operation was performed extraorally. It was necessary to split the masseter muscle and then separate the soft tissues from the bone sufficiently to expose a bare surface large enough to permit cutting a window to remove the imprisoned tooth. The wound was closed and a week later healing was complete, and the patient dismissed from the hospital.

At no time did the patient complain of postoperative pain except a slight soreness with some swelling. There was no trismus. Nine and one-half months after the operation the jaw was radiographed (Fig. 25). There is very little scar showing (Fig. 26).

In closing, may I call your attention to the fact that patients with misplaced deeply impacted molars with or without complications should always be hospitalized. The rest in bed and the postoperative care are essential to rapid healing and a favorable prognosis.

1403 N. Astor Street.

ABSTRACT OF
CURRENT LITERATURE

NUTRITION AND PEDIATRICS

By Samuel Adams Cohen, M.D., New York City

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Child's Reaction to the Movies. May V. Seagoe. J. Juvenile Research **15**: 3, 1931.

The Woman's Educational Club of the University of California, Los Angeles, undertook a study of the movie and the nature and extent of its formative power in the life of the elementary school child. Because of the importance of the movie in the modern child's life the importance of this study is apparent. The author has collected data on some 800 children, who were in grades 1 to 8 in schools in or near Los Angeles.

In her summary this investigator states that the movie is of almost universal importance as a factor in the child's life. She believes that the primary appeal of the movie seems to be emotional rather than intellectual. Because, as the writer further states, that from the educational point of view the greatest possibility of the movie lies in its social and moral influence, she suggests that parents should keep pace with the current cinemas and by means of discussion with the children help them in selecting their movie diet more carefully.

Febriphobia. Charles Herman. Arch. Ped. **48**: 9, 1931.

Herman, who has had considerable clinical experience in the care and treatment of children, takes up the discussion of a very touchy topic—fever. He is of the opinion that the anxiety produced by a marked rise in temperature in children when unaccompanied by other serious manifestations is out of all proportion to the danger.

Fever, the significance of which depends on the cause, is a symptom. Fever may be due to a large number of causes, and the author goes so far as to say that even crying may be sufficient to raise a temperature in some children.

The author comments on the fact that there are marked individual differences in the response of temperatures from the various causes, and he feels that the febrile reaction represents an attempt on the part of the organism to counteract the injurious effect of the entrance of foreign material. Herman brings out a very practical point when he states that the good effects of baths and packs is not due solely to the reduction of temperature (which is often slight) but also to the favorable effect on the nervous system.

The Treatment of Secondary Anemia. K. C. Smithburn, J. M. Masters, and L. G. Zerfas. J. Lab. & Clin. Med. **16**: 858, 1931.

After reviewing the current American literature on the success or failure of the administration of iron in the treatment of secondary anemia, these investigators, reporting from the Lilly Laboratories for Clinical Research in Indianapolis, tell of their experiences with iron as a therapeutic agent of treatment in secondary anemia.

As far as practical their anemia cases were fairly well studied, and when possible their iron medication in these cases was clinically controlled. Both organic and inorganic iron, in solution and in powder, were used and sometimes these were used in combination with liver extracts.

Despite the fact that relatively large doses of iron salts were used (maximum dose 0.78 gram or 26 Blaud's pills daily), these authors state that they have observed no toxic symptoms from overdoses.

In their summary the writers hold that soluble iron salts are of definite value in the treatment of certain cases of secondary anemia when administered in the sufficiently large doses. The results are most marked when the amount of iron in the system has been depleted, as by long continued anemia from loss of blood, over a prolonged period of time. Fever, infection and intoxication may be responsible for temporary or complete inhibition of the hematopoietic response during treatment with iron salts, liver extract or with both combined.

Sepsis in Infancy and Childhood. Isaac A. Abt, J. Mich. State. M. Soc. **30**: 8, 1931.

In a highly instructive article Abt briefly outlines the mechanism of infection and the defense reaction of the organism, particularly as they occur in the young. In sepsis, there is a primary focus of inflammation from which constantly or periodically bacteria or their toxins are poured into the blood stream producing general manifestations which overshadow the local changes in the primary focus. The author points out that a study of septic infection is to be considered not only in the light of the virulence of the offending organism (which, as is well known, varies clinically from season to season) but also in relation to the response of the defensive reaction of the body. Generalized infection or sepsis occurs only when the defensive mechanism of the body does not function effectively.

In this respect Abt mentions the work of Maximow who held that three cellular systems played a rôle in the defensive reaction against infection: (1) hemocytic response of which leucocytosis or increase of white blood corpuscles is clinical evidence of their activity; (2) the defensive action of the endothelium of the blood vessels; (3) the important functioning of the reticulo-endothelial system. According to Aschoff the reticulo-endothelial system consists of the reticulum cells of the splenic pulp, the malpighian corpuscles, the bone marrow, the lymph nodes, and other lymphatic tissues. Abt states that not only do these cells act as phagocytes but they probably produce enzymes and participate in the formation of antibodies and hemolysins.

This authority aptly points out that there is an evident difference in the

susceptibility of younger and older individuals to certain infections. In general it has been held that the lower immunity of the younger individual may be explained by a number of factors: the poor complement content of the serum, the weak antibody formation, and such nonspecific factors of the mucous membranes and the lymphatics.

The infant is hypersusceptible to sepsis because of the thinness of stratum corneum of the skin, and also because the mucosa of the stomach and intestines is readily traversed by living organisms. The importance therefore of extreme precautions to prevent sepsis in the nursling is obvious.

Abt states that probably the most frequent atrium for septic infection in childhood is through the tonsils, pharynx and the communicating cavities.

The author groups sepsis into three types. First is the acute type of sepsis which develops rapidly. This is usually hyperacute in its manifestations and may cause death in two or three days. Second, there is a chronic form of sepsis which finally manifests itself clinically as a rheumatism or a recurrent endocarditis. A third form of sepsis is that characterized by agranulocytosis. This last mentioned clinical entity involves the tonsils, pharynx, gums, tongue and larynx. The local process is necrotic, membranous and gangrenous. The characteristic blood findings show that the leucocytes are diminished, the lymphocytes preponderate and the granulocytes are practically absent from the hemogram.

In his discussion of treatment Abt states that it is regrettable that at this time no sanguine message can be brought regarding the treatment of septic infection. The most important is the prophylaxis. Symptomatic treatment should always be given. Although Abt states that opinion is divided concerning the benefits derived from the use of auto-blood injections, intramuscular, intraperitoneal blood injections and blood transfusions, he himself holds that a blood injection may be considered the most rational and appropriate form of nonspecific therapy.

The Problem of Pulmonary Tuberculosis in the High-School Age Group. J. B. Naive, J. Tenn. State M. Assn. **24**: 8, 1931.

The comparatively higher incidence of tuberculosis in this age group is aided by the fact that these younger individuals are often under a great strain, physically, mentally and with girls particularly, socially. Added to these contributing causes which lead to impairment of the individual's nutrition and growth, is the present-day style of the feminine sex to diet for the sake of reducing.

In the diagnosis of tuberculosis Naive mentions fever, subnormal weight, tendency to tire easily, poor appetite and frequent colds as the outstanding symptoms. Any or all of these symptoms should awaken a suspicion that tuberculosis may be present. In addition to a physical examination, an x-ray of the chest and a tuberculin test help to establish the diagnosis.

Prevention by careful living and avoidance of exposures to other individuals having tuberculosis, early diagnosis, and adequate treatment are the author's solution of this increasingly important problem of pulmonary tuberculosis in the high-school age group.

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EDITORIAL

Do Malocclusions Correct Themselves?

DURING the past few years, we have read several articles and listened to a number of lectures in which certain men, who have become prominent in the orthodontic profession, have advocated that certain types of malocclusion were self-correcting.

Up to the present time we have never seen any evidence which would justify this statement. We have seen a few models presented in which they claim the malocclusions corrected themselves, but in such cases as we have examined, the conditions were not true malocclusions.

It is our belief that these enthusiastic investigators have been led astray by considering certain phases in growth and development as malocclusions. This is substantiated by the fact that one of these investigators a few years

ago, examined a number of children of a certain age and claimed he found a small percentage of malocclusions. Therefore, as a result of these percentage tables, he contended that a certain percentage of malocclusions had spontaneously corrected themselves. The weakness of this argument lies in the fact that no man who is qualified to judge, saw these cases except the investigator. Certain experiences as he and others have cited to prove the spontaneous correction of malocclusions, were cases which were not malocclusions in the first place.

It is my belief that the vast majority of men in the orthodontic profession who have practiced for any considerable length of time, have never seen any true malocclusions which actually corrected themselves. The statements made by these enthusiasts in regard to spontaneous correction of malocclusion were received very lightly by the orthodontic profession. However, some of these men are making these statements to the dental profession and to lay audiences. Some of them are publishing articles in lay magazines and dental journals which are read by the general profession. There has always been a tendency for the general practitioner to advise the patient to wait—that the malocclusion would correct itself. We heard that argument twenty years ago, and we still hear it today. Patients are constantly coming to us with the statement that the dentist advised them to wait. Some of these patients were referred to the writings of these men as authorities on the subject.

There is no way to stop these enthusiastic writers who contend malocclusions are self-corrective; however, we regret the great amount of harm which they are doing by spreading this false doctrine to the public and dental profession. It simply means that men who know that malocclusions do not correct themselves, must make a greater effort to spread the correct information to the public and dental profession.

Correction

In the discussion of Dr. Cotton's paper, August, 1931, issue, page 724, the name Dr. Samuel Hurder should read Dr. Samuel Herder.

NEWS AND NOTES

Greater New York December Meeting for Better Dentistry

The seventh Greater New York December Meeting for Better Dentistry will be held at the Hotel Pennsylvania, New York City, November 30 to December 4.

The sessions will open at 2 P.M. Monday, November 30, with a joint meeting of physicians and dentists, and will continue through Monday afternoon and evening. The subjects to be covered are: (1) Relation of Nose, Throat and Ear Diseases to Oral Diseases; (2) Relation of Obstetrics and Pediatrics to Dental Diseases; and (3) Relation of Internal Medicine to Oral Diseases.

Admission to the regular sessions which begin Tuesday will be by card only. At 9 o'clock each morning a practical talk will be given, followed by lecture demonstrations, which will occupy the time from 10 to 12 o'clock. It will be necessary to make application for cards for these demonstrations.

Afternoon sessions on Tuesday will be confined to section meetings, on Wednesday to a symposium on practice management and on Thursday to topic discussions.

On Tuesday and Wednesday evenings scientific papers will be presented by members of the Chicago Dental Society who are coming to New York in a group, at the invitation of the First and Second District Dental Societies. Papers will be presented by:

Stanley D. Tylman	Arthur D. Black
Edward H. Hatton	R. C. Willett
Howard C. Miller	M. D. K. Bremner
F. Blaine Rhobotham	Frederick B. Noyes
Charles W. Freeman	John B. LaDue

On Monday evening a dinner will be given, which will be attended by both physicians and dentists assembled for the joint meeting.

On Wednesday noon a luncheon which has been dedicated to Children's Dentistry will be held in conjunction with the New York Tuberculosis and Health Association.

An exhibit by the dental manufacturers will continue throughout the meeting, and Friday morning has been reserved for clinics showing the uses of their various products.

All members of the American Dental Association are invited to attend this meeting, and programs will be mailed to members in New York, New Jersey, and Connecticut.

Members from other states can secure programs by addressing Miss Edith M. Davies, Executive Secretary, at 2 East 103rd Street, New York.

JOHN T. HANKS, Chairman.
CARROLL B. WHITCOMB, Vice-Chairman.

Southern Society of Orthodontists

The twelfth annual meeting of the Southern Society of Orthodontists will be held at the Netherland Plaza Hotel, Cincinnati, Ohio, December 1, 2, and 3.

The program committee has in the process of development what promises to be one of the finest programs ever presented before the Society.

The meeting will be held in conjunction with the Ohio State Dental Society. All members of the American Dental Association and members of the various orthodontic societies are cordially invited.

W. J. FITZPATRICK, President.
OREN A. OLIVER, Secretary.

Seventy-Fifth Anniversary of St. Louis Dental Society

Plans are being made for the celebration of the seventy-fifth anniversary of the St. Louis Dental Society, at Hotel Jefferson, December 7, 8, and 9, 1931.

The Chicago Dental Society Midwinter Meeting

The 1932 Midwinter Meeting of the Chicago Dental Society is to be held at the Stevens Hotel, Chicago, January 18, 19, 20, and 21.

The Program Committee already has in the process of development what promises to be one of the finest programs ever presented before any midwinter meeting of the Society. All members of the American Dental Association and members of recognized foreign dental organizations are cordially invited.

CHARLES R. BAKER, President.
HOWARD C. MILLER, Secretary.

The Dental Society of the State of New York

The Dental Society of the State of New York will hold its sixty-fourth annual meeting May 11, 12, 13, 1932, at Hotel Ten Eyck, Albany, New York. A cordial invitation is extended to all members of state societies, Canadian societies and ethical dentists.

The officers and committees will present a program which we trust will enlist the attention of all dental practitioners.

Dr. E. J. Burkhart, 800 East Main Street, Rochester, N. Y., is Chairman of the Program Committee; Dr. E. W. Briggs, 1116 Madison Avenue, Albany, N. Y., Chairman of the Exhibits Committee; and Dr. E. Burley, 80 Fourth Street, Troy, N. Y., Chairman of the Clinics Committee.

For further information address the Secretary, Dr. A. P. Burkhart.

DR. A. P. BURKHART, Secretary,
57 E. Genesee St.,
Albany, N. Y.

Reunion and Banquet to Be Held in November

The Baltimore College of Dental Surgery Dental School Alumni of New Jersey will hold a reunion and banquet on November 10 at the Elks Club in Newark, N. J.

Kindly communicate with Bernard Kniberg, secretary, 138 Clinton Ave., Newark, N. J.